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16, BLOOMSBURY STREET,
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Vol. 1





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ELEMENTS OF MEDICINE.

VOL I.

ON MORBID POISONS.

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LONDON:
B. FELLOWES, LUDGATE STREET.

1836.



P R E F A C E.

THE course, the symptoms, and the pathological phenomena of typhus, as well as of many other diseases depending on the action of a morbid poison, have been determined with so much accuracy, that little hope remains of new facts being added to those already discovered. But, although we are thus in possession of the necessary data, little progress has been made in deducing a sound theory, or in determining any general rule of treatment, in those instances for which no known specific remedy exists. It appearing, however, to be an almost demonstrable truth, that where a given disease could be shown to depend on the agency of a poison, in whatever manner generated, the laws and treatment of such affection must necessarily follow those of poisons generally, it remained to prove this hypothesis. The result is now submitted to the public; and if the argument shall be considered as established, it must be admitted that contagion is as important an element in medicine, as gravity in mechanics, or electricity in chemistry. The opportunities which a large hospital affords,

have made it a duty to deviate, in some instances, from the usual routine of practice, and to reduce the treatment to the simplest forms ; and the results of these experiments, especially in fever, erysipelas, and scarlet fever, have been so remarkable, that it is submitted whether at present they ought not to be adopted as the *basis* of our practice. Some apology is necessary for introducing syphilis, which by many is considered as a surgical rather than a medical disease, but it was impossible to avoid it, without greatly impairing the value of the Work ; and the physicians of hospitals are in the habit, perhaps, of seeing a much larger number of cases of secondary symptoms, which form the most difficult part of the problem of that disease, than even the surgeons ; while it is hoped that the improvements in their treatment, especially the introduction of the iodide of potassium, and the determining many of the uses of sarsaparilla, will prove lasting and permanent additions to medicine. Every medical work is of necessity imperfect ; but should some facts have been stated, or some views presented, worthy of the attention of the Profession, and which may contribute to render its labours more beneficial to the Public, the Author has attained his highest object, and his best reward.

CONTENTS TO VOL. I.

INFECTIOUS AND CONTAGIOUS DISEASES.

	PAGE
INTRODUCTION	1
TYPHUS	25
SCARLATINA	113
MORBILLI	165
VARIOLÆ	192
VARICELLA ^Y	251
ERYSIPelas	257
PERTUSSIS	297
APPENDIX :	
ON THE USES OF THE BROMIDE OF POTASSIUM	331

ELEMENTS OF MEDICINE.

INTRODUCTION.

THE causes of disease are of two descriptions; the one among other deleterious agents embraces mechanical injuries, errors in the quantity or quality of our diet, chemical or mechanical changes of the atmosphere, together with many moral and physical affections. This class of disturbing causes gives rise to diseases of simple inflammation, to the neuroses, hemorrhages, dropsies, and to those morbid secretions or depositions which occasion diabetes, cancer, phthisis, or other malady, according to the idiosyncrasy of the patient.

The other description of causes are miasmata, secreted either by the patient's person, or else generated by other sources known or unknown, and which contaminate the healthy recipient either through the medium of the atmosphere or by direct contact. This class of causes engenders diseases of a specific character, and which are either simply contagious, as syphilis, hydrophobia, the plague; or else both infectious and contagious, as typhus fever, scarlet fever, or the small-pox. It embraces also diseases which have neither of those properties, as the great class of paludal fevers and cholera.

The agency of causes so different, and producing phenomena so distinct, allows of disease being divided into two great divisions, or into diseases produced by general causes, and into diseases produced by the agency of morbid poisons.

The diseases of the latter class are numerous and frequently of the most formidable description. They assume on many occasions an epidemic character, and not only destroy the greater number of those that are swept prematurely away, but are often accompanied by unusual and violent symptoms. History affords the most awful instances of their ravages; and the last few years have placed before our eyes the cholera traversing Asia, and Europe, and America, and the northern shores of Africa, and producing an alarming mortality. Nothing, indeed, is so appalling as the visitations of this and similar plagues which have from time to time depopulated the largest cities, and spread in short periods over great portions of the earth; and they merit, on the part of the medical philosopher, the gravest attention, both on account of their peculiar phenomena, as also of their extreme intractableness and great fatality.

Many diseases of this class, however, either from their generally intermitting occurrence, being sometimes epidemic and then almost dying away for many months or years, or else, when of ordinary occurrence, from the great complexity of phenomena that accompanies them, have not as yet received that satisfactory explanation which their importance deserves.* It is proposed, therefore, to combine them in one great division, by which means the general laws which govern them will be rendered more apparent, and their differences more readily appreciable. And as it is apprehended morbid poisons are a class of substances whose general laws do not greatly differ from those which govern the actions of poisons generally, it will greatly conduce to the clearer understanding of this difficult

* One of the latest writers on typhus says, "One would naturally suppose, from the great prevalence of this disease, that its nature would be much better understood by physicians than almost any other. This, however, is not the case; and I am certain there is scarcely another disease about the nature and treatment of which physicians are more completely divided."—*Little's Practical Observations on Fever, Dublin Journal, March 1835.*

The same variety of opinion prevails on syphilis. Mr. Samuel Cooper, in his very valuable Surgical Dictionary, p. 1219, says, "Confessing my own inability to reconcile the various theories about the nature and effects of the venereal poison, to many facts which are disclosed in practice, I shall now proceed to offer a few remarks on each of the primary and secondary symptoms."

subject, to introduce it by a short exposition of the great principles which govern the actions of both these descriptions of agents.

Poisons, of whatever nature, are subjected to certain general laws. The most important of these laws are ;—Firstly, that poisons have all certain definite and specific actions ; Secondly, that they lie latent in the system a certain but varying period of time, before those actions are set up ; and, Lastly, that the phenomena resulting from the poison, when roused into action, vary according to the dose or the predisposition of the patient. These laws are common to all poisons ; there are also many others which are peculiar to individual poisons, or classes of poisons, and it may be necessary to notice a few of them.

The law of the definite and specific actions of poisons results from physical principles ; for if it be supposed that agents acting on the human body do not produce their effects according to certain definite laws, and therefore not out of physical principles, we can neither determine the seat or course of any given disease, nor judge of the operation of remedies. The definite action of causes is the basis of human knowledge, and is equally true in medicine as in every other science. No physician, for example, has seen castor oil produce tetanus, or colchicum intoxicate the brain, or opium inflame the spleen ; he perfectly well knows that the first of these substances acts on the intestines, the second on the ligaments, and the third on the nervous system generally. The action of poisons, therefore, is not accidental, but governed by certain definite laws. The action of poisons, though definite, is variously limited. Some poisons, for instance, act on one membrane, or on one organ, or on one system of organs ; while others extend their influence over two or more membranes, or organs, or system of organs, of the animal frame. We have examples in aloes and jalap of substances that act on one membrane only, or on the mucous membrane of the intestinal canal ; in digitalis, of substances that act on one organ, or the heart ; while strychnine is an example of a medicine acting on a system of organs, or on the spinal

chord, since, when given in a sufficient dose, it produces violent action of all the voluntary muscles.

It is seldom, however, that the action of poisons is limited to one membrane, or organ, or systems of organs; the greater number of these noxious agents more usually act on two or more membranes, or organs, or systems of organs. Elaterium, for instance, acts on the mucous membrane of the intestinal canal, and on the kidneys. Tobacco nauseates the stomach, and affects the heart. Antimony is an instance of a remedy having a still more extensive range of action: it induces violent perspiration of the skin; acts cathartically and emetically, and in large doses causes gangrene of the substance of the lungs. Alcohol and opium are also examples of substances acting generally on three great nervous systems, producing infinite disturbance of the brain, the chord, and the great sympathetic, and subsequently setting up limited or specific local actions: the alcohol destroying the coats of the arteries, while the opium disorganizes the brain. In these respects the action of these latter substances greatly resembles those of many morbid poisons, as those of typhus fever, scarlatina, &c. &c.

Mr. Hunter thought that no two poisons could exist in the same system together, or that, co-existing, they could not set up their specific actions at the same time. This hypothesis, however, is unquestionably erroneous, for we constantly see opium and digitalis, jalap and mercury, as well as many other combinations of medicines, producing their respective effects in the same system at the same time. We also see that combinations of cathartics, having, as far as is known, no different seat of action, greatly increasing or modifying the actions of each other. There is no truth better established, for instance, in medicine, than that a combination of senna and salts produces a much more efficient and pleasant action, than the exhibition of either remedy separately; and opium is an agent possessing a modifying or controlling power over every tissue, without which it would be impossible on many occasions to reconcile the system to the introduction of many necessary and essential remedies. Poisons, therefore, are

capable of co-existing together in the same system, and their actions are often simultaneous on the same tissue.

Another minor law of medicinal poisons is, that some are cumulative, while others are either not absorbed into the system, or else are so rapidly removed that no cumulative effect is produced: thus in persons predisposed to the action of the remedy, a dose of digitalis, so small as to produce no sensible effect whatever, will, if frequently repeated, at last destroy the heart's action; and in cases in which it is desirable to produce vomiting at the least expense to the constitution, the means employed are cumulative, or a repetition of small doses of ipecacuanha or other emetic substance.

This cumulative property of poisons is by no means universal. There is no instance, for example, of jalap or castor oil proving cumulative; and if a frequent repetition of them produces an increased effect, it is perhaps in consequence of the nervous papillæ, with which they are brought in contact, being more easily irritated by each application; and hence they induce a more violent result.

The second important law of poisons is, that they lie latent in the system a period of time, which varies in different individuals, before they set up their specific actions. Rhubarb, for instance, produces no immediate result, but lies dormant in the system from six to eight hours before its action is sensible on the bowels. Opium, in the usual dose, is generally thirty minutes before it subdues the brain to its influence. The convulsions caused by strychnine do not follow till twenty minutes after the exhibition of that substance; and perhaps every substance except hydrocyanic acid has a greater or less period of latency.

When a medicine, however, acts on more parts than one, a considerable space of time may elapse after it has affected one organ before it affects another. Thus digitalis frequently occasions emesis before it acts on the heart; and the action of mercury is frequently sensible for many weeks on the bowels before its ultimate action on the salivary glands is set up. The doctrine of the latency of poisons is indeed so generally

admitted, that their actual period of latency has been a point on which the condemnation or acquittal of a prisoner tried for murder has turned in our courts of justice.*

The third great law of poisons is, that being once roused into action, their effects are at all times much modified by the dose, the temperament, or present state of the constitution of the recipient. The effect of the dose in modifying the pathological phenomena of disease may be exemplified in the actions of oxalic acid and arsenic. The specific action of oxalic acid † is to inflame the mucous membrane of the stomach; but to ensure this effect the dose must be limited, so that it may lie in the system many hours. On the contrary, if the dose be excessive, and rapidly absorbed, it so disorders all the functions of the three great nervous centres, that life is destroyed in consequence of this irritation in a few minutes, and not a trace of disease is to be found in any part of the body. Arsenic ‡ is likewise a poison that requires some hours to set up its specific actions; so that when the dose is large it destroys by general irritation, and not a trace of morbid change is to be found after death. It follows from this law that the larger the dose, or the greater the intensity of the poison, the more rapid its action, and the less the probability of finding any trace of specific disease.

Temperament is also a circumstance which greatly influences the actions of poisons. There are a few persons altogether insensible to the action of mercury, and no quantity of it will affect their gums, or increase the secretion of the salivary glands. There are others, in like manner, the actions of whose heart no quantity of digitalis will control. On the contrary, there are some constitutions so morbidly susceptible of these remedies, that it is scarcely possible to exhibit the fraction of a dose so minute as not to give rise to their specific effects.

Besides natural temperament, habit, which may be termed an artificial temperament, has a powerful influence in recon-

* See the Trial of Freeman for the murder of Judith Buswell, at Leicester, April 2, 1829. Christison on Poisons, p. 666. See also Trial of Miss Butterfield, for the murder of Mr. Seawen, 1775. Ibid. p. 371.

† Christison on Poisons, p. 199.

‡ Christison, p. 300.

ciling us to particular classes of poisons, and of making them even sources of enjoyment. Thus tobacco, alcohol, opium, are all substances which, in the first instance, are to many persons productive of great discomforts, but by frequent repetition they cease to produce any unpleasant effects, and their stimulus at length becomes a necessary indulgence. Still there are many poisons to which no repetition can habituate us, as arsenic, corrosive sublimate, or the preparations of copper; on the contrary, each repetition only the more debilitates the constitution, and renders it the more susceptible of the poison.

The present state of the constitution has also a powerful influence on the action of poisons; and it would seem proved, that perhaps, with some exceptions, those agents act with an intensity proportioned to the debilitated state of the patient. There is, indeed, no duty more imperative on the physician than that of adjusting the dose to the strength of the patient; and nothing is more common than to forbear administering a medicine, because the patient's strength will not admit of it. As a general principle, therefore, it may be said that medicines act with a power proportionate to the debility of the patient.* Still there are states of disease which render the constitution of the patient, though greatly debilitated, insusceptible to the action of even powerful remedies. Thus in typhus fever, the patient will bear a considerable quantity of vinous stimuli without being affected by it. In tetanus and hydrophobia no quantity of opium will tranquillize the symptoms, or produce sleep. The experiments of Majendie afford a very curious proof of the effects of debility in accelerating the actions of a poison, and also of certain states of the

* It is a popular prejudice, that if we would prevent the action of mercury on the system, we must give a purgative draught the next morning, which will carry it off. Dr. Fordyce brought this opinion to the test of experiment. He selected in the wards of St. Thomas's Hospital a given number of patients, whom it was thought necessary to bring under the influence of mercury. To one half of these persons he gave five grains of calomel every night, and followed it up the next morning by a purgative draught. To the other half he gave the same quantity of calomel, but omitted the purgative draught. The former patients were much sooner under the influence of mercury than the latter; a result which can only be accounted for on the supposition that the debility occasioned by the purgative medicine must have rendered the constitution more susceptible of the mercurial sialagogue.

constitution in retarding their actions. That physiologist has shown, if a poison be introduced into the system of such potency as usually to destroy life in two minutes, on bleeding the animal the same result will follow in half a minute, or in one-fourth of the time. Two rabbits were poisoned by strychnine in St. Thomas's Hospital: one was bled and the other not bled; the former died in twenty minutes, while the latter survived for forty-five minutes. Majendie has also brought to light the curious fact, that the greater or less fulness of the blood-vessels greatly influences the action of poisons; for after poisoning an animal, he injected aqueous fluid into its veins in such quantities as to cause an artificial plethora; and as long as this unnatural fulness of the blood-vessels could be maintained, the action of the poison was superseded. No sooner, however, did this plethora cease, than the poison acted in its usual time, and with its customary severity.*

The general laws observable in the actions of morbid poisons are for the most part precisely similar to those which govern medicinal substances, or only differ in a few minor points. These poisons have their specific actions—their periods of latency, while their phenomena equally vary according to the dose, or the predisposition of the patient.

The specific actions of morbid poisons are distinctly proved by the fact that we are enabled to determine within certain limits the course, the symptoms, and the pathological phenomena which result from the presence of any given morbid poison of ordinary frequency of occurrence. No man, for instance, can confound the phenomena of small-pox with those of intermittent fever, or those of intermittent fever with syphilis, or those of syphilis with cholera; each of these poisons has its separate and peculiar laws, and consequently its actions are definite and specific.

The actions of morbid poisons, however, like those of medicinal substances, are variously limited, some affecting only one membrane, or organ, or system of organs, while others involve two or more membranes, or organs, or systems.

* Majendie de Physiologie, p. 272, *et seq.*

Thus tinea capitis is an example of a poison acting on one tissue of the body, and even then partially, namely, on the cutaneous tissue of the head. The waters of Switzerland contain a poison, whose action is limited to the thyroid gland. The contagion of hooping-cough, and the virus of hydrophobia, affect all the organs supplied by the eighth pair, or pneumogastric system. Instances of morbid poisons acting on two or more membranes, or organs, or systems of organs, are still more common, and form the great body of this class of disease. The poison of measles, for instance, acts no less on the mucous membranes of the eyes, nose, fauces, and perhaps even on the mucous membranes generally, than on the skin. That of scarlatina acts more especially on the mucous membranes of the fauces, also on the skin, the synovial membranes, and also on the peritoneum, occasioning ascites. The paludal poison has a still more extensive range, no organ or tissue of the body being exempt from its destructive ravages.

Morbid poisons may coexist in the same individual, and even produce on some occasions their specific effects on the same membrane at the same time. Erysipelas is frequently seen to coexist with syphilitic eruptions. The eruption of measles with that of small-pox was formerly not uncommon. Examples of morbid poisons affecting different tissues are still more frequent; thus syphilis may coexist with hooping-cough, with measles, with the vaccine poison, and with a great variety of dissimilar diseases.

Morbid poisons also, like other poisons, have their periods of latency; and, generally speaking, a much longer time elapses before their specific actions come into operation, than takes place with medicinal substances. The virus of the natural small-pox lies dormant from sixteen to twenty days before it produces any constitutional disturbance; and a still further period elapses of three or four days before the specific eruption appears on the skin. The poison of scarlatina lies latent from seven to ten days after exposure to the contagion; that of measles from ten to fourteen; while the poison of paludal fever has been known to lie dormant for a twelve-month, and that of hydrophobia for a still longer time.

These are examples of periods of latency far beyond anything that has hitherto been observed in the actions of medicinal substances.

When morbid poisons act on more tissues or organs than one, their actions are sometimes simultaneous; but more commonly they are consecutive, and frequently long intervals of time elapse between each successive attack. Thus the poison of typhus fever may attack the lungs, the membranes of the brain, and the mucous membrane of the alimentary canal, and all these may be attacked contemporaneously; but it is more common that these attacks take place consecutively; or on the alimentary canal, then the brain, and lastly, on the lungs. In syphilis, cases have been met with in which the throat, the skin, and the bones, have been affected at the same time with the primary sores. It is more common, however, for these secondary symptoms, as they are termed, to occur, if not altogether seriatim, yet at very remote periods from the primary affections, so that many years frequently elapse before the poison has entirely exhausted itself. In scarlatina also, the peritoneum is not affected till many days after the eruption of the skin and the ulceration of the throat have altogether disappeared.

It occasionally happens that morbid poisons, which usually act on a plurality of membranes, exhaust themselves on one or more, without affecting the whole series. In the disease termed scarlatina simplex the poison exhausts itself entirely on the cutis, without affecting either the mucous or serous membranes of the body. The rubeola sine catarrho is a similar example. Intermittent fever, when the dose of the poison is limited and the disease properly treated, seldom involves any organ or tissue; yet left to run its own course, scarcely an organ or tissue would escape the destructive actions of the poison.

Sometimes when a poison acts on many membranes, the usual order of attack is inverted. It is the general law of syphilis, that the bones are the last in the order of the secondary symptoms to suffer, but sometimes they are the first to be affected. In scarlet fever the affection of the skin

may precede that of the throat, or the reverse ; and in fever the affection of the head may precede that of the intestines, though the latter is most common.

When two morbid poisons coexist in the same system, their actions, it has been seen, are sometimes simultaneous, and each disease runs its course unaffected by the presence of the other. The more usual law of febrile poisons perhaps is, that when two of them coexist, the one lies latent, while the other runs its course ; or they interrupt each other's progress, the active one becoming latent, while the latent one becomes active ; and occasionally they also modify each other's actions. A case of intermittent fever was admitted into St. Thomas's Hospital, which was not controlled in the usual time by medicine ; suddenly however it subsided, and the small-pox appeared. The small-pox having run its course, and the patient being recovered from that disorder, the intermittent fever returned, and the disease now readily yielded to quinine. A child having been exposed to the infection of small-pox was vaccinated ; in a few days, however, the small-pox appeared, and ran a very modified course. When the small-pox had entirely subsided, some action was seen in the punctured part of the arm, and the cow-pox vesicle formed, but not till three or four weeks after the time it usually appears, and was exceedingly small.

It has been seen that the period of latency of medicinal substances being passed, and their actions set up, that their effects varied in a considerable degree according to the dose. It unfortunately happens with morbid poisons, that the living body is the only measure we possess of the strength or dose of the miasmata. It is impossible, therefore, to speak on this law, except in conjunction with the temperament or susceptibility of the patient ; but thus considered, the law holds equally good with respect to morbid as to other poisons. There can be no question but the paludal miasmata of tropical countries, greatly exceed in intensity those of more temperate climates ; and accordingly in many cases hardly a trace of disease is to be found after yellow fever, so intensely severe and rapid is that disorder. In the Walcheren fever, on

the contrary, a disease perhaps equally fatal, but more chronic and of less intensity, enlarged livers, disorganized spleens, and dropsy, marked every case. There are many instances recorded by Jenner and others of children whose constitution has been greatly susceptible of the poison of the small-pox, having died even after inoculation from convulsions, and general nervous irritation, and before the more specific action on the skin has been induced. It may therefore be laid down as a general law, that when a morbid poison acts with its greatest intensity, and produces its severest forms of disease, that fewer traces of organic alteration of structure will be found than when the disorder has been of a milder character.

As a general principle also, it may be stated that morbid poisons act with an intensity proportioned to the feebleness of the constitution of the patient; but this law is not universal. The hardy mountaineer is a surer victim of paludal fever, whether he visits the low countries of the tropics, or the marshes of a more temperate climate, than the feebler native of those countries. The immunity the latter enjoys compared with the former, is probably owing to his habit of living in the noxious atmosphere; for let him remove to a more healthy climate and then return to these regions of pestilence, and he will be found as susceptible of the poison as the hardiest stranger. The state of plethora, or otherwise, of the blood-vessels has, in many instances of cholera and of hydrophobia, been shown to greatly influence, and even to suspend the particular phenomena incident to those poisons.

The principal points in which the laws of morbid poisons agree with those of poisons generally having been stated, it will now be necessary to briefly state those circumstances in which they principally differ. Many medicinal poisons, it has been seen, have the property of accumulating in the system, and acting with an intensity proportioned, not to the last dose, but to the aggregate of the whole quantity that has been administered. There is, however, no well-authenticated fact which can be arranged under this law in the whole circle of morbid poisons. For the quantity of a morbid poison necessary to produce a given disease, is often so small as to be

quite inappreciable. It is probable that a certain *intensity* of the poison is necessary to produce disease, and that below that point it may circulate without injurious effect, but the quantity hardly appears to affect the result. The experiments of Dr. Fordyce strongly support this hypothesis. That physician, in hopes of mitigating the small-pox, inoculated with virus greatly diluted; but the disease was produced, and being produced, it assumed every form and character. It has also frequently happened, that the severest forms of syphilis are inflicted by persons who are scarcely themselves suffering, and are only in a very slight degree tainted with the infection. It follows, then, that when the quantity or intensity of a poison is sufficient to set up the specific disease, the result is determined by the temperament or constitution of the patient.

Another peculiar law of morbid poisons, and one wholly unknown to medicinal substances, is the faculty which the human body possesses of generating to an immense extent a poison of the same nature as that by which the disease was originally produced. A quantity of small-pox matter not so big as a pin's head will produce many thousand pustules, each containing fifty times as much pestilent matter, as was originally introduced; and, moreover, it infects all the secretions of the body. The secretions of one patient, as a child labouring under the hooping-cough, are sufficient to infect a whole city.

Perhaps there is a still more remarkable law of morbid poisons, and unknown to those of a different class, which is, that many of them possess the extraordinary property of exhausting all future susceptibility in the constitution of the party affected to any similar action of the same poison. This is the case with the poison of scarlatina, of measles, of small-pox, of the hooping-cough, and, indeed, of a considerable class of diseases. It would seem that this protective influence is common to many morbid poisons for a short time; for it is certain that few persons are liable to suffer twice from the same epidemic, and, consequently, it follows that the previous action of the poison must for a time impair the

susceptibility of the constitution to its attacks. This beneficent law is of great importance in social life; it enables those that have recovered to tend on those that are sick, and allows a mother fearlessly to nurse her child in a dangerous and contagious distemper.

It only remains to mention one other law, which is but little shared by poisons of the vegetable or mineral kingdoms. It is well known that the actions of vegetable or mineral poisons are not influenced by the climate in which they are administered: climate, however, has the property, not only of modifying the intensity of morbid poisons, but also of influencing their specific actions. The severe forms of typhus fever so common in northern countries, are entirely unknown at the equator; and the cholera of India has been infinitely more fatal in Europe than in the country which gave it origin. But besides influencing the intensity of the disease, climate or season greatly modify the specific action of the morbid poison. In one season in London, typhus fever will attack only the glandular structure of the intestinal canal; in another, only the mucous tissue of the same parts, the glands or follicles being healthy. In one season, the small intestines may be the seat of the disease; in another, the large; and in a third, both. The generic character of the disease remains the same, but its specific character varies. The same variety of pathological phenomena is caused by peculiar idiosyncrasy. How various are the peculiarities of the small-pox eruption! and how different the distinct, the confluent, and the horn pustule, from each other! and yet all these different varieties of disease may exist in different persons inoculated with the same poison. The peculiar character of that vaccine pustule which insures exemption from all attacks of the small-pox, has not yet been determined; neither have pathologists determined the primary forms of syphilitic ulcers. It is important, therefore, to remember in the study of morbid poisons that absolute uniformity of pathological phenomena, and, consequently, of symptoms, is not to be expected. It is abundantly sufficient, however, for the purposes of science, to have proved the general law,

and to have determined the limits within which nature has bounded her deviations.

The laws of poisons are more important than their *modus operandi*; but this part of the subject has been deeply investigated by modern physiologists, and deserves some consideration.

The early moderns substituted for the imperfect humoralism of the ancients, the doctrine, that the solids were the great and primary cause of disease; and of all the systems of the solidists, that of Hoffman was the most approved, and which referred all diseases to the altered actions of the nerves. This theory was subsequently greatly improved by De Whytt, who curiously investigated the reciprocal actions of distant parts on each other, and attempted to show that *in all cases* the co-existence of two remotely diseased parts was caused by the intervention of the brain, which reflected the diseased actions of the nerves primarily affected to those remote parts which chanced to be either simultaneously or consecutively diseased. The theory of Hoffman was prevalent in the days of Fontana; and that great physiologist being a convert to the doctrine, he determined to prove it by actual experiment. With this intention, he laid bare the sciatic nerve in a great number of rabbits, and after taking every precaution that the poison should not affect other parts than that nerve, he applied to it the venom of the viper, the poison of the ticunas, and hydrocyanic acid; but, to his surprise, none of the phenomena of poisoning ensued, and, indeed, no other consequences than those which must have resulted from a similar mechanical injury; and he adds, "I had need of all the experiments on the nerves thus far related, and which are in so great number, and varied in so many different ways, to be fully and clearly persuaded of this circumstance."

It may be objected that the phenomena of poisoning did not take place in these experiments in consequence of Fontana's acting on the trunks of large nerves, and not on their sentient extremities. This objection, however, does not seem of great moment; for an injury done to the trunk of a nerve gives as much pain to the animal—his struggles are as great,

and the part it supplies even more affected than when a similar injury is inflicted on its sentient extremities. Fontana having failed to prove the theory of Hoffman, determined to ascertain whether the phenomena of poisoning were capable of being explained by the hypothesis of absorption, he therefore injected the venom of the viper, hydrocyanic acid, and other substances, directly into the veins of different animals, and he found that, although the nerves of a part may be steeped in these poisons with impunity, yet no sooner did these substances enter the vein than the animal, after uttering a few horrible shrieks, struggled, writhed, and died almost instantaneously; and thus was demonstrated the existence of a tissue of extreme sensibility to the actions of poisons, and which, being in contact with them, would at least account for the death of the animal.

Fontana pursued this subject one step further. It occurred to him if the nerves were the medium by which the phenomena of poisoning were produced, that by amputating the poisoned limb before they became apparent the life of the animal might be saved. Accordingly, he submitted a number of pigeons to be bitten in the leg by the viper, and chopped it off at different intervals after the introduction of the venom; yet he found, as a result of an extensive series of experiments on several dozens of pigeons, that none recovered when the poisoned leg was removed at a later period than twenty-five seconds, though the phenomena of poisoning did not occur till several minutes after. These experiments satisfied Fontana, since the almost instantaneous removal of the injured part did not prevent the fatal catastrophe, that the malignant cause must have been absorbed with extreme rapidity, and had produced the phenomena of poisoning by being thus introduced into the system.

The experiments of Fontana had shown, supposing a poison to be introduced into the veins, that all the phenomena of poisoning were accounted for; but still it might be said that the fact of absorption was something wanting of strict demonstration—and to the further prosecution of this interesting subject we are indebted to the French physiologists.

Ségalas* made an incision into the abdomen of a dog, and separated a portion of intestine in such a manner that it hung pendant, and attached only by the mesentery. He now tied the mesenteric arteries and veins which supplied this separated portion of the intestine, and having introduced a strong aqueous solution of alcoholic extract of strychnine into it, which he confined by ligatures, he returned it into the cavity of the abdomen. The phenomena of poisoning ought, under these circumstances, to have been manifested in a few minutes, supposing the nerves of the *part* to be the agents by which life is more immediately destroyed; yet an hour elapsed, and the animal showed no symptom of this quick-acting poison. Ségalas now removed the ligature from the vein, and the usual phenomena took place at the end of six minutes.

The experiments of Messrs. Delille and Majendie are still more conclusive of the fact of the absorption of poisons. Those gentlemen, having previously stupified a dog with opium, dissected out the crural vein and artery, and, with the exception of those parts, they amputated the thigh of the animal; and into the paw of the limb, now connected with the body only by the artery and vein, they introduced two grains of upas tieuté; and scarcely had the fourth minute elapsed than the animal was labouring under the effects of the poison, and before the tenth minute it was dead.

Majendie thought it might be objected, that the effects of the poison in this case were produced by means of the coats of the blood-vessels, and not in consequence of absorption. To obviate this objection he repeated the preceding experiment on another animal, with this modification; that, having introduced a portion of a quill into the artery and vein, he was enabled, on amputating the thigh, to divide both those vessels in such a manner that the limb hung connected with the trunk solely by means of the quill, through which the circulation was still carried on. The poison was introduced into the paw as in the former instance, and in four minutes the animal was under its influence.—(P. 265.)

* Majendie de Physiologie, vol. ii. p. 204.

These experiments have been repeated at Bartholomew's Hospital by Mr. Pereira and Mr. Lloyd,* and at St. Thomas's by Mr. Macmurdo, and with the same success.

By these experiments it is apprehended that Fontana, Ségalas, and Majendie, have completely demonstrated the fact of the absorption of poisons by the veins, and consequently of their circulating with the blood; and, that no doubt might remain on the subject, modern chemistry has demonstrated the actual presence of many of these substances either in the blood itself, or else in the secretions from it. Dr. Bostock gives the case of a young lady who took large quantities of soda for the cure, as it was hoped, of incipient phthisis. He examined, in the course of his treatment, the serum of the blood, and found it to be alkaline, "much more so than ordinary," and "containing an unusual quantity of uncombined alkali."† Alcohol is known to enter largely into the circulation; and has been obtained by distillation from the blood. In a patient, who was brought into St. Thomas's Hospital, after having drank a large quantity of gin at a draught, the odour of alcohol was readily detected in the blood drawn from the arm. The presence of iodine is easily detected by many tests in the urine and in the saliva; and so rapidly is this substance removed, that it may be tested in the urine a few minutes after it has been introduced, even in a moderate dose, into the stomach.‡

* Medical Gazette, Oct. 10th, 1836, p. 36.

† Medico Chirurg. Trans. vol. v.

‡ Many other substances are said to have been found either in the blood or urine, (see Christison on Poisons, p. 14); but some of them have been disputed, and others are questionable. The following are the reasons assigned by Dr. Christison, p. 15, why they are not more frequently detectable by chemistry. "The more general rule," he says, "certainly is, that poisons which appear to enter the blood cannot be detected either in that fluid, or in the animal solids. This may be owing to several causes. The quantity which enters the blood-vessels may be too small to be detected after being distributed throughout the body. Thus, a grain of corrosive sublimate will kill a middle-sized dog; a third of a grain of strychnine I have seen kill a wild boar; and two grains of arsenic would certainly kill a man, if injected into a vein. But these proportions are so small that no chemist would undertake to discover them, even supposing the whole quantity absorbed to be collected in the blood alone, and not to be partly distri-

In the experiments that have been described, the poison appears to have been introduced into the circulation by means of the veins, and it probably may be absorbed by other systems of vessels; but this is not distinctly proved. It is ascertained, however, that each tissue of the body has the property of absorbing poisons; so much so, that the poison of the plague proves infectious through the medium of the skin, and even without any abrasion of the cuticle.

The poison having once been introduced into the circulating torrent, in what manner does it act? Dr. Addison and Mr. Morgan are of opinion, that, on entering the blood-vessels, it makes an impression on the nerves supplying the inner coat of the vessel, and is then instantly destroyed; while the impression made on the nerve is conveyed to the brain, whence it is reflected to the parts secondarily affected. The more recently received opinion, however, is, that poisons are conveyed unchanged, or only modified, to the parts on which they more specifically act; and certainly the weight of evidence is greatly in favour of this latter hypothesis. For it is quite impossible to explain the fact of iodine and a variety of other substances, being found in the urine,* and other secretions of the body, or else thrown off by the lungs,

buted in the other fluids and solids. Again, the poison may be partly or wholly removed, before death, beyond the reach of analysis, in consequence of its having passed off with the excretions. This appears to happen in the instance of iodine, which passes off rapidly by the urine; and it obviously happens in spirituous liquors, the alcohol of which passes off quickly by the breath. Farther, it is not improbable that certain poisons are, in the course of a short time, removed from the blood, and concentrated in particular organs." "But other poisons, particularly of the organic kingdoms, are probably decomposed in the blood without that fluid undergoing any apparent change. Dr. Coindet and I, in one of our experiments, injected into the femoral vein of a dog eight and a half grains of oxalic acid, which caused death in thirty seconds. Here it was impossible that the poison could have passed off by any of the excretions; yet we could not detect even that large portion in the blood of the iliac vein, and vena cava, collected immediately after death."

* Stehberger has detected the following, as well as many other, substances introduced by the mouth in the urine;—the colouring matter of rhubarb—of black cherries—of madder—of logwood—of indigo—of the pulp of the cassia; also, gallic acid—the tanin of *uva ursi*—hydrocyanates of potash and of iron—one of the constituents of elder, which last gave to the urine a deep yellow colour.—*Zeitschrift für Physiologie*.

without inferring that these poisons have been carried to those parts either in substance, or else resolved into their elements—a state which, for anything we know, may be equally deleterious with the original compound. Some substances, also, have been found unchanged and embedded in the bones as madder. There is, likewise, no fact better proved in physiology, than that the different tissues of the body are acted upon by particular stimuli only. Thus the retina is insensible to sound—the tympanum to light. The secretions of the bladder and intestines produce healthy actions of those viscera; but if through disease these parts communicate, and their contents mingle, gangrene, and the saddest results are the consequence. There is little question, consequently, but that poisons are conveyed to the parts on which they act, and produce their effects by immediate contact, and not by the intervention of the brain; for the brain has been removed in animals poisoned by strychnine, and yet the phenomena of tetanus have resulted.

The fact of morbid poisons, in like manner, mingling with the blood has been shown by many continental writers; but, perhaps, the experiment which most satisfactorily proves it, is that made by Professor Coleman. “I have produced the disease (the glanders) by first removing the healthy blood from an ass until the animal was nearly exhausted, and then transfusing from a glandered horse, blood from the carotid artery into the jugular vein. The glanders in the ass was rapid in its progress, and violent in degree, and from this animal I afterwards produced both farcy and glanders.”*

The same fact is also proved by Horne and Speranza, (*Bibliotheca Italiana*,) and especially the latter, who, not being able at all times to procure sufficient lymph from the vesicular portion of the eruption in measles, in their experiments of inoculating for that disorder, made slight incisions into the most livid spots with a lancet, and inoculated with the effused blood. The phenomena of measles commonly appeared in a few days.

* Coleman's Letter to Travers, “Inquiry concerning Constitutional Irritation,” p. 352.

The ingenious, valuable, and interesting experiments of Fontana, Ségalas, and Majendie, have thus traced a large class of poisons into the blood, but they do not warrant the conclusion they have drawn from them, or that the *modus operandi* of poisons is by absorption; for the cries of the animals, their writhings and contortions, when a poison is injected into their veins, distinctly show that in a last analysis we must admit the nerves to be the agents by which life is discharged from the body—the fact of absorption only removing the poison from contact with a membrane for whose nerves it has no affinity, to one for whose nerves it has a most marked affinity, a circumstance which affords a very strong confirmation of the doctrine of the specific actions of poisons.

But although it has thus been shown that many poisons lie in harmless contact with many tissues, and only act through the medium of the inner membrane of the circulating system, it would be wrong to suppose that all poisons must of necessity act through this medium, for many substances act on other tissues, for which they have no healthy affinity, and are equally productive of death, or other disastrous consequences. A quantity of wine, for example, which produces healthy actions of the alimentary canal, if injected into the cavity of the peritonæum, acts as a poison, and produces inflammation and death. The fatal result in this case, probably proceeds from a morbid affinity existing between the wine and the sentient extremities of the nerves of the peritonæum, and not in consequence of absorption; for alcohol circulating with the blood is not proved to have any action on that membrane. It must be admitted, therefore, that every tissue, according to some unknown structural conformation of its nerves, has its peculiar vital affinities, and is capable of producing death or disease, when acted upon by particular classes of agents.* As a substance also, which, circulating with the blood, will inflame

* Some substances also appear to act both on the nerves of the part and also by absorption, or on the inner membrane lining the circulating system, as narcotics.

and disorganize the liver, yet passes over a precisely similar tissue in the lungs without producing any effect whatever—it follows, that parts having apparently the same structure, may nevertheless have a great variety of peculiar and different vital affinities. These affinities, however, are much affected in health and in disease, and undergo many evident changes; thus the liver may be gorged in health with bile, and not a particle of it be absorbed, while in disease, though a much smaller quantity is secreted, bile is often rapidly taken up, and the patient becomes jaundiced: and from this, and similar circumstances in other organs, results the doctrine of predisposing causes.

The facts and arguments which have been adduced, have, it is apprehended, distinctly proved that morbid poisons act in all instances, not capriciously, but according to certain definite and specific laws, modified only by the influence of climate, temperament, or the magnitude of the dose; also, that they mingle with the blood with which they continue in latent combination a certain but varying period of time; and likewise that many of them are capable of coexisting together in the same system. Two other remarkable laws result from the study of morbid poisons, or that these singular agents are not acted upon by medicinal substances, as long as they continue latent; and again, that when they act on more tissues than one, the remedy which is an antidote to its action on one, is absolutely powerless when it affects another tissue: so that many different remedies are frequently necessary to combat the varying phenomena of the same disease. These laws form the basis of the present work; and it is hoped, that by their application, many of the difficulties which have hitherto obscured the doctrines of fever, of syphilis, of hydrophobia, and of many other of the diseases incident to the class of morbid poisons, may be removed, and that this portion of medical science may be found to be placed on a surer foundation, if not on a permanent basis.

THE DISEASES THAT ARE BOTH CONTAGIOUS AND INFECTIOUS,
ARE—

Typhus.	Varicella.
Scarlatina.	Erysipelas.
Morbilli.	Pertussis.
Variolæ.	

THE DISEASES THAT ARE SIMPLY CONTAGIOUS, ARE—

Variolæ Vaccinæ.	Pestis.
Syphilis.	Cellulitis Venenata.
Gonorrhœa.	Cellulitis Farciminoso.
Hydrophobia.	Tinea.

THE DISEASES THAT ARE NEITHER CONTAGIOUS NOR INFECTIOUS, BUT DEPEND ON THE AGENCY OF CERTAIN MIASMATA, ARE—

Febris Palustris.	Dysenteria Palustri.
Cholera Indica.	

This catalogue might perhaps admit of some additions, as Catarrh, Influenza, Angina Parotidæa, &c.; but it has been thought preferable, until the arrangement shall have received the approbation of the profession, not to introduce any disease that might give rise to controversy.

T Y P H U S,

Is a continued febrile disorder, having no intermissions ; it runs a course of very varied length, and is both infectious and contagious.

OF THE TYPHOID POISON.

THERE is but one simple continued fever known in this country, and that is caused by the agency of the typhoid poison.

The early history of typhus fever is involved in much obscurity. The ancients, living in a warmer latitude, were either unacquainted with this disease, or else confounded it with the severer forms of remittent or of symptomatic fever. Galen indeed speaks of a fever "having bile for its cause," and that "such fevers are hot and dry," and that "heat is a cause of putridity." But his description has none of the characteristic symptoms of the continued or putrid fever, as it has been termed, of this country, while his explanation of its nature is void of all foundation.

The opinions of Galen were adopted by the medical profession on the revival of letters, and were implicitly believed during many ages. Sydenham, perhaps, is the first physician who ventured to differ from so great an authority, and to offer a new theory for explaining the phenomena of fever, or that of fermentation. This doctrine, however, is hardly an improvement on that of Galen, nor is it an evidence of his possessing any sounder knowledge of the causes and nature of fever than his predecessors; neither do his writings afford any sufficient ground for inducing us to believe that he was able to contradistinguish typhus by its contagious nature from the severer forms of paludal fever, epidemic in London in his day, and which are not contagious. Willis, perhaps, is the first medical writer who has distinguished between these two classes of disease. He tells us that in 1658, a *new fever* raged and appeared suddenly throughout all the country, and which "*was contagious.*" Of this fever also Morton speaks, who affirms that "*the whole island was infected by the poison —*

the public hospitals being full, and in some places the healthy being scarcely in sufficient numbers to attend the sick." This fever they state to have again prevailed in 1664 and 1666, and from their description, there is no ground for doubting that it must have been typhus fever.

Fever, however, spreading by contagion, was too remarkable a circumstance to escape the notice of the early British chroniclers and historians. Their bias led them to record all those facts which laid powerful hold on the public mind; they were also less impregnated with classical prejudices than the medical writers of those days, and, consequently, it is in their works that we find the first traces of typhus. In a scarce tract, republished by Wood, in his History and Antiquities of Oxford, we find that a contagious fever "broke out at the assize of Cambridge, when held in the Castle there, in the time of Lent, 13 Henry VIII. 1521, 1522. For the justices there, and all the gentlemen bailives and others resorting thither, took such an infection that many of them died, and almost all that were present fell desperately sick, and narrowly escaped with their lives." This was the first black assize, and the earliest record of fever communicated by contagion.

Another instance of contagious fever is related by Hollingshed:—"At the assizes kept at the citie of Exeter, 1586, when there happened a very sudden and strange sickness, first among the prisoners in the gaol of the castle of Exon, and then dispersed, upon their trial, amongst sundrie other persons."—"The sickness was very sharp for the time, and few escaped which were first affected therewith. It was contagious and infectious, but not so violent as commonlie the pestilence is."

There are many other black assizes on record, but the last and most remarkable happened at the sessions of the Old Bailey in 1750, and which proved fatal to the Lord Mayor, to two of the judges, and to several eminent and other persons, who were infected by the contagion of the jail fever, brought into court, as was supposed, by the prisoners from Newgate.

Previously to this period the fever of each year was supposed to be a fever of a distinct type, and exceedingly multifarious.

Sir John Pringle, however, physician to the British army in the Netherlands, had long observed, that when the hospitals of the army were crowded with sick, a fever of a malignant nature always prevailed among the patients, and was generally fatal. This led him to suspect, that when fever broke out in crowded jails, it must be of a similar nature, and accident furnished him with an opportunity of establishing his conclusion. It was the custom in those days to recruit the army directly from the prisons; and at the time of the Rebellion, "when the army was encamped at Newcastle, Litchfield, and Inverness, in 1745, about the end of May, Houghton's regiment, with three more, sent as a reinforcement, landed at Nairne, and joined the army: a few days after, twelve men of that corps were sent to the hospital of fever; but on bleeding them largely, as for common fever then prevailing in the camp, the pulse sank, and some had an uncommon stupor." "But on further inquiry, it was found that the fever came directly by infection from the true jail distemper, and in the following manner:—Not long before a French ship had been taken on the coast of England, on board of which some troops had been sent to assist the rebels, and amongst them a few English soldiers, who in Flanders had gone over to the enemy. These deserters, on being taken, were thrown into jail, where they were kept till the opportunity offered of sending them by the transports to be tried by a court-martial at Inverness. They were thirty-six in number; and having brought with them the jail fever, they gave it to this battalion, with which they happened to be embarked." Sir John Pringle then adds—"The symptoms of the jail fever were in every point so like those of the hospital fever, that as they were formerly only conjectured to be the same distemper, they were now proved to be so:" and being thus introduced, it soon spread, not only in the hospitals, but among the inhabitants of the town.

Having thus established the identity of these supposed different diseases, Sir John Pringle, shortly after the fatal occurrence at the Old Bailey, published his "Observations on the Nature and Cure of Hospital and Jail Fevers," having, as he observes, met with "no author who has treated of them

in so full and clear a manner as to enable a physician either to know or cure them." This work was an epoch in the history of medicine. The doctrine it taught was generally received by the profession; and subsequent observation has shown the fevers of different years to be uniform in character, though differing in intensity, and that all simple continued fevers in this country, by whatever name distinguished, as jail fever, hospital fever, low fever, nervous fever, brain, putrid, or bilious fever, are mere varieties of the same continued and contagious disease—typhus fever.

The remote cause of the typhoid poison is at present hidden among the profoundest secrets of nature, and no pathologist has as yet been able to give any account the least satisfactory of its origin. Dr. Bancroft, in his valuable work on fever, has, with singular acumen, investigated every hypothesis hitherto imagined as giving rise to it, and has shown so many exceptions to the agency of the alleged cause, as entirely to destroy our belief of its being capable of producing the effect attributed to it. The two hypotheses which are most entitled to be considered are, first, that it is the effluvia secreted by the bodies of healthy or other persons, when confined in a very limited space, and in an unchanged atmosphere, and the second is, that it is the miasmata generated by dead animal matter. The following are the arguments against admitting either agents as the efficient cause of typhus fever.

Sir John Pringle and Cullen are among those pathologists who consider the effluvia arising from the bodies of even healthy persons, when congregated together, and the air not sufficiently changed, to be the cause of typhus. To this hypothesis, however, Dr. Bancroft has opposed the case of a slave ship, in which formerly less space was allotted to each person than he would have occupied in his coffin; also the case of the Decade frigate, in which, at the breaking out of the French Revolution, 193 emigrants were deported from France to Cayenne, so closely packed as to form almost a dense mass; and also the frightful catastrophe of the Black Hole at Calcutta, when 146 persons were thrust into a dungeon, so small that in a very few hours 123 of their number perished by heat and

suffocation. These are all extreme instances of a number of living persons being confined in an unchanged atmosphere, and loaded with human effluvia, without any contagious fever being generated, though flux—scurvy—boils, and death followed.

Many writers of celebrity, and among these the great Lord Bacon, have imagined that no effluvia were so infectious and pernicious as the miasma that issued from putrefying animal matter, and more especially those from the corruption of the human body, and that these were the cause of fever. There are many facts, however, on a large scale, which completely decide this hypothesis to be erroneous. The churchyard of St. Innocens, at Paris, is situated in one of the most populous quarters of that city. It had been the depository of so many dead bodies, that one grave-digger alone calculated that he had interred more than 30,000 corpses. The poorer inhabitants were buried in coffins made of very thin deal boards. These were stowed as closely as possible upon and beside each other, in large pits, each about thirty feet deep, and capable of receiving from 1200 to 1500 bodies. The pits being filled, the coffins were covered with a stratum of earth about a foot in depth, and the bodies left to putrefy. It commonly happened, however, that this space was wanted in fifteen or twenty years for other bodies, when this mass of animal corruption was then dug up, and a like number of recent corpses deposited in the same pit. At length the soil, having been raised eight or ten feet above the level of the adjoining street, and the smell arising from it becoming very offensive, it was determined in 1786, (the public mind being greatly alarmed,) to forbid all further burials, and to remove so much of the superstratum as would reduce the surface to the level of the street. This work was entrusted to M. Thouret, an eminent physician at Paris, and under his superintendence the noxious superstratum was levelled.

"These exhumations,"* says this gentleman, "were principally executed during the winter, but a considerable part of them was also carried on during the greatest heats of summer. They were begun with every possible care and with every known

* Journal de Physique, 1719, p. 253.

precaution, but were afterwards continued almost for the whole period of the operations without employing, it may be said, any kind of precaution whatever. Yet it does not appear, after the fullest inquiry, that any febrile disorder was produced among the workmen by the removal of this immense mass of animal corruption. The grave-diggers were, indeed, sometimes thrown down suddenly, and for a time lay in a state of asphyxia from the concentrated effluvia which escaped upon accidentally breaking open with their spades the abdominal viscera of bodies in an early state of putrefaction; they also suffered nausea, loss of appetite, debility, tremor, &c. from the effluvia, in a dilute state, yet fever of any kind is not noticed as having occurred either among the labourers or the surrounding inhabitants. There are many other similar exhumations of minor extent that have been carried on with a like immunity; and these facts, together with the general exemption of butchers, sugar-bakers, tanners, &c. &c. distinctly show that the putrefaction of dead animal matter, though it may predispose to typhus fever, is not the active poisonous agent producing it.

Since we are unable, then, to trace the efficient agent of typhus by any demonstrable evidence to animal miasmata, and it being universally received that vegetable miasmata generate an entirely different class of disease, or fevers of an intermittent type, two other hypotheses have been imagined as to its origin; the one is, that the typhoid poison exists at all times diffused through the atmosphere of certain countries; the other is, that the human frame, when acted upon by certain predisposing causes,—as heat, cold, moisture, or having suffered a great mechanical injury, as the fracture or amputation of a limb, or else from some local inflammation or other debilitating circumstance,—is capable of spontaneously generating the typhoid miasmata. The first hypothesis, however, appears to be that which is most entitled to be received; for the fact, of typhus fever being peculiar to countries of a certain latitude, and entirely unknown between the tropics, and diminishing in intensity in proportion as we approach them, and also according to

Dr. Lind as “it has a land origin,”* plainly shows that the poison of typhus has a distinct local source. The first hypothesis is consequently proved; and if it be unphilosophical to admit the agency of two causes in explanation of the same phenomena, the theory of a spontaneous generation of the poison, however plausible, is negatived. It results, therefore, that we must admit the typhoid poison to be generally diffused through the atmosphere; for typhus fever, in those countries to which it is a native, is equally present in the crowded and populous city, and in the lone and solitary hut; and, in proportion to the population, is as frequent on the mountain as on the plain. The poison, also, may be affirmed to exist at all periods of the year, for no season is free from its ravages; but it varies greatly in quantity or intensity, the fever being mild or fatal, sporadic or epidemic in different years.

Although it must be admitted that the remote cause of typhus fever is not strictly traced to its source, nevertheless it is certain that the disease being once formed, the contaminated body of the patient generates a poison capable of inducing a similar disease in a healthy person. The evidence of this fact is most abundant.

On the return of the French fleet, in 1757, to the port of Brest, the crews were so completely disabled by fever, that seamen were sent from other ships in the harbour to bring it to anchor. The sick being landed, fifteen hospitals were fitted up for their reception, and physicians and surgeons voluntarily came from all parts with offers of service. The fever was for a time confined within the walls of the hospitals, and the mortality to those landed from the fleet; but it soon spread to the attendants; and five physicians, 150 surgeons, 200 almoners and nurses, together with many galley slaves, who, under a promise of liberty, had been induced to attend on the sick, fell victims to this fever. In our own naval

* “Indeed, I have always observed,” says Dr. Lind, “that the most healthy ships are such as have arrived from a long foreign voyage, the scurvy being the chief and almost the only complaint among them; whereas ships of war, when fitted out in the Thames, even in times of peace, very often received this infection from London.”

service, Dr. Lind saw so many examples of typhus spreading by contagion in Haslar hospital, as to have enabled him to deduce some of the most important laws of the typhoid poison.

The experience of the army also affords many striking examples of fever spreading by contagion. In the Peninsular War it made great havoc in all the general hospitals of our army. In 1812, at Ciudad Rodrigo, typhus seized on all the ward-masters, nurses, orderlies, and, with one exception, upon every one of the medical officers attending the hospital, and many of them died of it. In the same year typhus broke out also at Vizeu, in the first brigade of guards, and eleven hospital serjeants and many orderlies caught the disease. A still more striking example, perhaps, occurred on the return of our troops from Corunna: a large number of these troops, labouring under typhus, were landed and sent to the hospitals of Plymouth, Falmouth, and other outports on the western coast. At the time of their arrival there was no fever prevailing in any of these hospitals, yet the fever spread in all of them, and more especially at Falmouth, where all the medical officers and servants were speedily taken ill. It also attacked 103 men of the North Hants militia, who happened to be stationed there, and eleven of them died.

During the whole period of the Revolutionary Wars typhus followed in the march of the French armies, and spread along their route. In the campaigns of 1804 and 1809, typhus did not spare a single village on the route from Strasbourg to Vienna; and in 1812 the long line from Mayence to Vienna was in like manner infected. In 1814, when the French, driven back at every point, were compelled to fight for the preservation of their own capital, some soldiers labouring under fever were admitted into the Hospital Salpêtrière. At the time of their admission, the hospital, which partakes more of a poor-house than of a hospital, was healthy, but in a short time the fever spread, and eight physicians died; also all those persons charged with the clothes and effects of the patients died. It attacked likewise those who superintended the

fumigation of the wards, as well also as 120 other persons attached to the hospital.

The charitable institutions of Great Britain afford an equally strong evidence of the contagious nature of typhus fever. In Dublin, in 1819, Dr. Reid tells us, that in the hospital to which he was attached, the nurses and medical officers were repeatedly attacked with fever, and more particularly those gentlemen whose duty it was to bleed the patients. Dr. Cheyne also gives a similar testimony of the spread of fever in the hospital to which he belonged.

When Queensbury House was formerly occupied by fever patients, every resident clerk, and every nurse in the house, was successively affected with the disease; and when it was re-opened in December (1826,) the resident physician, two of the clerks, (who had not been resident, but had been several hours a-day in the house,) the apothecary, several servants, and all the nurses except two, in all above forty individuals, who had necessarily close intercourse with the sick there, had fever.

"During the epidemic (1827-1828) as well as that of 1817 and 1819," says Dr. Alison, "many of the clerks and nurses employed in the Royal Infirmary have taken fever. Since November last, six of the clerks employed in the clinical wards only, four of those employed in the ordinary wards, and twenty-five nurses or servants, have taken fever. All these persons had necessarily frequent and close intercourse with the fever patients in the house, having been employed more or less constantly in the fever wards, excepting only four of the servants; of these four, two had been employed in the laundry where the linen from the fever wards was washed; one was a porter employed at the gate, who would of course have communication with the fever patients at their entrance and dismissal, as well as with their relatives coming to visit them; and one was a nurse employed in the servants' ward, but who was in the habit of visiting the fever wards." He adds also, "that in this very place, those of its inhabitants who have not had intercourse with fever patients have almost uniformly

" escaped the disease. Of the inhabitants of the ground floor of the house, (including the patients in the lock ward,) none but those already mentioned as having washed the linen from the fever wards, and the barber who shaved the heads of the fever patients, have taken the disease; yet in a case of malaria it is the ground floor of the house which is generally found the most dangerous. No one of the nurses whose duty has confined them to the medical or surgical wards, where no fever patients were admitted, has taken fever, with the single exception of the woman in the servants' ward above-mentioned; and of the numerous patients in these ordinary wards, the only one who has taken the fever within my knowledge during the present year, was a patient in the men's general clinical ward, who lay in the bed next the door that communicates with the clinical fever ward. If there be malaria in this house, therefore, it would seem to restrict itself in point of space, as at Queensbury House in point of time, to the immediate vicinity of the fever patients."*

In the metropolis the same contagious character of fever has been observed. Every physician connected with the London Fever House, with one exception, says Dr. Tweedie,† has been attacked with fever, and three out of eight have died; also the resident medical officers, matrons, porters, laundresses, domestic servants not connected with the wards, and every female who has performed the duties of nurse, have, one and all, invariably been the subjects of fever. And to show that the disease is capable of being engendered by fomites or clothes, the laundresses, whose duty it is to wash the patients' clothes, are so invariably attacked with fever, that few women will undertake this loathsome and disgusting office. In the years 1816, 1817, when fever prevailed in London to a great degree, seven sisters, or nurses, more immediately about the fever patients, died in St. Thomas's Hospital, while no other person less in contact with the sick took the fever. This establishment is remark-

* Edin. Med. Surg. Journal, vol. xxviii. pp. 238, 239.

† Tweedie on Fever, p. 88.

able for its extreme cleanliness, yet isolated cases are perpetually occurring of nurses falling victims to their care and attention to the fever patients.

It must be superfluous to accumulate further evidence of the contagious nature of typhus fever. The establishment of fever houses,—the sad results which take place within their walls, from the spread of the contagious miasma; a fact supported by men who have not attempted to draw any theoretical conclusions from it,—distinctly prove, as strongly as human evidence can prove any thing not strictly demonstrable to sense, that the contaminated person of a fever patient generates a poison capable of communicating a similar disease to a healthy, predisposed subject.

The poison which has thus been proved to be the cause of typhus fever, is subjected to certain laws. It is capable of being diffused through the atmosphere, and, according to its intensity, of producing disease at certain distances—it also infects fomites—has a predilection for certain victims—lies latent a given period, gives rise to a certain series of phenomena, and the course of those phenomena is modified by modes of treatment.

Predisposition.—As a general principle, the poison of typhus follows the law of most other poisons, in selecting for its victims the broken in spirit and enfeebled in constitution. It always marches in the train of war and famine, and aggravates the horrors of those calamities. In the year 1740, a year of great distress, typhus broke out in Ireland, and it is calculated that upwards of 80,000 persons died of it. In 1816, a year also of great scarcity, 50,000 persons laboured under it in Dublin alone: it also raged in London in that year, and many died of it. In all the campaigns that have been fought in modern times on the continent of Europe, typhus has been a more fearful enemy to the troops than the sword, and we lost a large number of men from this cause in the Peninsula. Every agent, then, whether moral or physical, which depresses the mind, or debilitates the body, predisposes to fever.

Infecting Distance.—The person of a patient being, from idiosyncrasy, or other cause, predisposed to this disease, at what

distance from its source will the contagious miasma infect the party? This question is of difficult solution; for it appears that air strongly impregnated with infectious miasma may be breathed for a short time, and when weakly impregnated for a long time, with impunity, by many persons; still, however, we are enabled to approximate to the truth. The fever wards of the Chester Infirmary were the first establishment on the principle of fever houses, and are situated within thirteen yards of some other wards of the building, yet during the space of more than twelve years fever was not known to have extended to them. The House of Recovery at Manchester is situated in the most crowded part of that town, yet Dr. Ferriar tells us, that so far from fever spreading in that quarter, it was the first that was cleared of it. The experience also of the London House of Recovery is equally satisfactory. The original establishment was a small private house in Gray's-Inn-Lane, standing in a row, and in contact, with thin and slender-built houses on either side; but during fourteen years, although the wards were generally occupied by fever patients, and the windows kept partially open, no fever was known to have been occasioned by its vicinity. It is plain, therefore, that the contagion of fever will not pass many feet through the open air.

Dr. Lind was of opinion that the disease is only communicated by a close approach to the sick, in a well-ventilated room, or by fomites, and a long experience in the London hospitals has shown this to be the fact. The space which separates the beds in these establishments is little more than three feet, and except when fever cases have been admitted in too large proportions, the disease has been seldom known to spread from bed to bed. Three feet around the patient's person may therefore be said, under circumstances of ordinary precaution, to ensure an exemption from the infection. A nearer approach, or actual contact, it is evident, from the number of nurses attacked, is a much surer means of contamination.

Communication by Fomites.—The communication of the disease by fomites has been instanced by the attack of the persons entrusted with the care of the clothes and other effects of the patient at Sâlpêtrière; as also by the constant com-

munication of the disease to the laundresses of the fever houses. It is supported, also, by all the best authorities in medicine. The following fact is mentioned by Sir John Pringle. A boat conveyed a number of fever patients, covered by an old tent, from the hospital to Ghent, and the troops being disembarked, the tent was given to twenty-four workmen to be mended, and seventeen of them took the infection. Dr. Lind also states—"the body of the diseased kept neat " and clean is not so liable to impress the taint as his late " wearing apparel, or dirty linen, or any uncleanliness, long " kept in that impure state. These last contain more con- " centrated and more contagious poison than the newly- " emitted effluvia of the sick."*—An extract from Dr. Bateman will show how intimately these dangerous miasmata will sometimes adhere to the walls of an apartment in which a fever patient has lain.

" Before the establishment of this Institution, (the London " Fever Hospital) it was well known to the physicians of dis- " pensaries, and to other medical practitioners who were " accustomed to visit the poor, that contagious fever, when " once introduced into a house or alley, continued to " commit its ravages for a long period of time; not only " attacking the same individual again and again, but even " the successive occupants of the same dwelling."

Mode of Absorption.—The typhoid poison being diffusible in the atmosphere, is most usually introduced into the system by means of the mucous membranes, and more especially of the mucous membranes of the pulmonary organs. We have no direct evidence of the skin absorbing the typhoid poison, but it is so probable, that little doubt can remain on the subject.

Period of Latency.—The typhoid poison being absorbed into the system, most probably infects the blood, and continues to circulate with that fluid in a latent state till some accidental or other cause rouses it into action. This period of latency varies much in different individuals. It is perfectly well known that many persons in health have sickened immediately on entering the chamber of a person ill of fever; but this is not often the

* Lind on Fevers and Infections.

case, and Dr. Haygarth (p. 68,) estimates the more usual period to vary from a few days to a few months; and the tables of Dr. Bancroft agree with this calculation. On the return of our troops from Corunna, ninety-nine orderlies and nurses, who had not been out of the kingdom, nor, as far as is known, exposed to any febrile contagion, were attacked at the following periods :—

One was attacked on the 13th day of his attendance ; one on the 14th ; two on the 15th ; one on the 16th ; four on the 18th ; two on the 19th ; three on the 20th ; six on the 21st ; four on the 22d ; four on the 23d ; two on the 24th ; six on the 25th ; four on the 26th ; four on the 27th ; eight on the 28th ; five on the 29th ; three on the 30th ; three on the 31st ; two on the 33d ; three on the 36th ; four on the 37th ; one on the 38th ; four on the 39th ; one on the 40th ; two on the 42d ; three on the 44th ; one on the 45th ; five on the 47th ; one on the 48th ; three on the 52d ; two on the 54th ; one on the 58th ; one on the 60th ; and one on the 68th day.

Dr. Bancroft is of opinion that a much longer period of time may elapse after contamination till the appearance of the disease, for that sickness, and among it fever, continued to prevail in the army for several months afterwards. The following case is an instance of an apparently longer period of latency. A man slept with his father, nursed him, and lost him in typhus early in the spring of 1828. In the September following this person sickened with a most violent form of fever, and was only recovered with great difficulty. Now supposing this man to have imbibed the contagion from the only source to which he could trace it, five or six months must have elapsed from the time of his exposure to the cause till the appearance of the disease. The extreme periods, then, which the poison of typhus may lie latent, vary from a few hours to a few weeks, or perhaps to a few months.

Co-exists with other Poisons.—It is a law also of the typhoid poison that it is capable of co-existing with many other poisons. It is not unusual to see the combination of typhus and scabies—of typhus and syphilis—and of typhus and erysipelas ; and the latter is so frequent, that in the London Fever

Hospital erysipelas is said sometimes to stalk from bed to bed, destroying the hope which had otherwise been entertained of the recovery of the patient.

Pathology.—The typhoid poison having been absorbed and mingled with the blood, and the period of latency passed, it primarily induces certain derangements of the *functions* of the great nervous centres, and consequently of the many organs and systems they supply; derangements which constitute the phenomena of fever; as alterations of temperature—changes in the force or frequency of the pulse—disorders of the alimentary canal, with other concomitant affections. After a certain time, however, not yet accurately determined, the typhoid poison, in addition to the febrile phenomena, induces certain local lesions or alterations of structure in a limited number of organs or tissues of the body. The alterations of structure are, first, inflammation of the mucous membrane of some portion of the intestinal canal, which membrane is the great and primary, if not constant seat of the action of the poison; secondly, inflammation of the membranes of the brain, which, though not constant, are frequent; thirdly, certain cutaneous eruptions, likewise frequent, but not constant; and lastly, inflammation of the substance or bronchial membrane of the lungs, or both, which occurs in a small number of cases only.

The law, that fever precedes the great specific actions of the typhoid poison, is deduced from the fact, that there are many instances in which the patient has fallen in typhus, and yet no alteration in the structure of any organ has been traced: it is consonant also with the laws of other morbid poisons. The specific actions of the poisons of small-pox or of scarlet fever are not set up till after some days' preliminary fever; and the phenomena of intermittent fever precede frequently by many weeks or many months the occurrence of any local affection. What period of time elapses in typhus after the febrile symptoms are established till the occurrence of the organic lesions, has not as yet been determined, on account of the extreme infrequency of death occurring in the first days of the disorder. But it is probably in most cases short; for

* *Leçons de Clinique Médicale*, p. 66.

Chomel had an opportunity of examining a case which died on the seventh day of fever ; and he found the follicles of the mucous membrane of the intestinal canal enlarged. The facts, therefore, are in perfect accordance with the alleged law.

The second great law of typhus fever, or that the poison almost uniformly acts on some portion of the mucous membrane of the alimentary canal, is a discovery of modern times, and a brief account of the steps which have led to it is a tribute we owe to the fair fame of those that have achieved it. Whatever feeble light may be found in Bonetus on this subject, Sir John Pringle is the first who can be said to have rudely connected fever with its true pathology. He examined ten patients who died of typhus, and came to the conclusion that when it proves fatal it generally terminates either in an actual mortification of some part, or in an abscess of the brain, "and that the intestines are more particularly disposed to mortify." These examinations were made in the year 1750. In 1760 the northern parts of Germany were occupied by the French, and Gottingen was in their possession ; and in addition to the other horrors of war, fever prevailed in that city. Under these circumstances, Rædererus and Waglerus had many opportunities of studying this disease, and of investigating its pathology ; and they state that they found intense inflammation of the alimentary canal ; and that either gangrene and sphacelus occurred in the tract of the large intestines, or else that the mucous follicles of the small intestines were enlarged with similar spots of gangrene or sphacelus. This result would have been of infinite value had they been able to generalise disease, but they considered this fever to be one *sui generis*, and a variety of intermittent.

No nearer approximation to the real pathology was made till 1803, when M. Prost published a work, entitled, "Le Médecine éclairé par l' Observation et l' Ouverture des Corps," in which he states he had opened the bodies of upwards of 150 persons, who had died of fièvres ataxique, without observing any thing remarkable in the brain, but that he

* Médecine éclairé par l' Observation, vol. i. p. ix.

always found inflammation of the mucous membrane of the intestines with or without "excoriation."

This was a great step, but unfortunately M. Prost divided fever into such a multitude of varieties, even to a twentieth subdivision, that the most minute discriminator could not follow him. No further progress was made in this interesting subject until the year 1813, when the council general of the Civil Hospitals at Paris expressed a wish that the resources of that establishment should be more particularly directed to clinical instruction. This wish on the part of the French government was an appeal to the zeal of the physicians of that establishment, and in 1813 appeared the joint work of Petit and Serres, "*Sur la Fièvre Entero-mesenterique.*" This fever was unquestionably typhus, but they describe it as a peculiar fever, whose pathological phenomena were inflammatory alteration of the mucous follicles of the ileo-cæcal valve, and of the parts immediately above and below it, together with alteration of the mesenteric glands corresponding to the inflamed portion of the intestinal canal, which they found to be in a state of greater or less disorganisation in every case. This work greatly contributed to guide pathologists in their investigation of the great and primary seat of disease in fever, and it is to be much regretted that the want of a knowledge of the laws of poisons prevented these able physicians from following out the subject in all its details. They limited themselves to affirming that this fever was a distinct species, and a variety of the many different species of fever that deform the French school of medicine. They considered the entero-mesenterique fever, as they termed it, to approach to the "adynamique and ataxique" fever in character; to the "mucous" in its seat; and as their last conclusion, they affirm it to be a link "*l'anneau,*" uniting these three species of fever.

The merit of the works that have been mentioned is unquestionably very great; and the labours of subsequent pathologists have terminated in showing that the mucous membrane of the alimentary canal is in a state of greater or less disease in almost every case of continued fever; that it is more uniformly inflamed than any other viscus or tissue; and

consequently, that it is the great seat of the secondary actions of the typhoid poison. This law is now so uniformly admitted, that Louis considers disease of the elliptical patches of the small intestine, together with the alteration of the corresponding mesenteric glands, as inseparably connected with typhus, and as forming its anatomical character,* while Andral admits that lesions of the intestinal canal occur in ninety-eight cases out of one hundred.†

The evidence of these very considerable authorities, supported as it is by the experience of every practical physician of this country, is abundantly sufficient to establish the fact of the mucous membrane of the alimentary canal being very constantly the seat of disease in fever, and also of its glandular structure being very generally affected. But the works of Bouillaud, of Andral, of Chomel, of Alison, and also the more fugitive productions of many other physicians, all contain instances of fever, in which, on examination after death, either no morbid appearance was found in the alimentary canal, or else other disease than that of the mucous follicles, as diffuse inflammation of the web of the mucous membrane, or of its connecting cellular tissue, the follicles themselves being sound ; and there is hardly a year passes that cases of this kind do not present themselves in the great hospitals of London. Those pathologists also are in error who have limited the action of the typhoid poison to some particular portion of the alimentary canal—as to the ileo-cæcal valve, or the stomach ; for it has been proved, that in many cases the colon, or ileo-cæcal valve, or the small intestines, or the stomach, may be individually the seat of inflammation, or else that the poison may affect any and every combination of those parts.

It is these exceptions to the general law which has induced pathologists to doubt whether it was possible to refer alterations of structure so various, sometimes trifling, and sometimes severe, and also changes in their seat so striking and so remarkable, to one and the same cause; and consequently many physicians have been led to entertain the hypothesis of a plurality of poisons.

* Louis sur Gastro-entirite, &c. vol. iii. p. 449.

† Clinique Médicale, vol. iii. p. 462.

It is, however, on points of this intricacy that a knowledge of the general laws of poisons enables us to reconcile discrepancies so apparent, and at first sight so fatal to the hypothesis of one cause; for it is apprehended that a reference to these laws will show that the exceptions that have been mentioned are not greater deviations from their general law than are common to the laws of poisons generally. Is the dose of the typhoid poison in excess, and the disease rapidly fatal, we should naturally expect, as in the case of an excessive dose of arsenic, or of oxalic acid, that the morbid appearances would be either trifling or altogether wanting; while, supposing the dose to be milder, we should equally expect much more extensive marks of the specific action of the poison. When we observe also the poisons of small-pox, or of scarlet fever, producing their specific eruptions, sometimes on the cutis, sometimes on the mucous membranes, and not unfrequently on both, we can hardly feel surprised that the poison of typhus may sometimes attack one of the constituent parts of the same membrane, sometimes another, and occasionally different combinations of those parts. When we know also that poisons which act on two organs, as that of hooping cough, will sometimes affect one organ and sometimes another, we have most abundant authority for believing there is nothing remarkable in the typhoid poison occasionally affecting one portion of the alimentary canal, and occasionally another portion. It is admitted that we cannot determine the inexplicable modification the poison must have undergone to produce these various results; but the differences that have been mentioned in no degree disprove the unity of the efficient cause, nor are greater deviations than are common to the laws of poisons generally. Every pathologist, therefore, will be prepared to admit occasional and limited differences in the seat of the disease, as also of the pathological phenomena affecting those seats in typhus fever.

When the typhoid poison sets up its great specific action on the mucous membrane of the alimentary canal, that of the cæcum, or ileo-cæcal valve, is in a great majority of cases the exclusive seat of the disease; but in a smaller number of cases

the inflammation extends its ravages both upwards and downwards, from a few lines to many inches, from those points as from a centre. In a few instances, however, the colon or small intestines, or the stomach, is the exclusive seat of the disease, or the poison may involve any combination of those parts. The inflammation thus excited may attack the free surface, or the adherent surface of the mucous membrane, or it may fall on its most common seat of action, the mucous follicles, and attack these parts either separately or conjointly.

When the poison falls on the free surface of the mucous membrane of the alimentary canal, it excites diffuse inflammation of the part, which may terminate either by resolution or by ulceration. Diffuse inflammation of the mucous membrane of the alimentary canal, in whatever part it occurs, is characterised by a deep venous colour, almost approaching to blackness. The substance of the membrane is also generally thickened, and its adherent surface usually, though not constantly, softened so that we can readily detach large portions of it by means of the handle of the scalpel.

Diffuse inflammation, though it sometimes terminates in resolution, yet in fever more frequently ends in ulceration ; and the ulcers vary greatly in number, form, and character. There may be one or several, their form may be either regular or irregular, and their edges may be either elevated or depressed, indurated or broken down. If the ulceration proceeds, the muscular and serous tunics are involved, and a livid congested spot, seen through the peritoneal coat, marks the precise seat of the ulcer ; and if the disease proceeds still further, the intestine bursts, and the patient dies of peritonitis. In a very small number of cases the specific action of the poison falls exclusively on the cellular tissue connecting the coats of the intestines, and, perhaps, principally on that of the colon. This inflammation usually terminates in the formation of a number of small abscesses, over which the mucous membrane softens and bursts, and then their contents are discharged into the intestinal canal. The appearance of this form of inflammation is that of a pustular disease, and has been compared to the small-pox. These abscesses sometimes

burrow in an opposite direction, and the patient dies, as in the former case, from peritonitis.

It has been thought by many pathologists that the specific action of the typhoid poison was on the mucous follicles, or glands of the intestinal canal; further experience, however, has shown that although this form of disease may characterise every case in one year, it may be altogether wanting in another, while in a third, every constituent part of the membrane may be occasionally affected. When the glands are inflamed by the presence of the poison, it is more commonly those of the ileo-cæcal valve, then those of the elliptical patches of the small intestines, and lastly, those of the colon. These glands are liable to three degrees of inflammation; or to the serous, the adhesive, and the ulcerative inflammation—and all these may exist separately or conjointly in a patient labouring under typhus fever.

When inflamed in the first degree, or that of serous inflammation, the gland, scarcely visible in health, becomes greatly enlarged in consequence of effusion into its substance, while the transparency of its tissues causes it to appear translucent, with a black point in its centre, which is the excretory duct. In children and others, when the fœcal matters are void of bile, the gland is colourless like a drop of water; but when much bile is present, it usually represents the appearance of a drop of amber.

The second stage of follicular inflammation is marked by the gland having lost the transparency of the first stage, and being reduced in bulk compared with the first degree of inflammation, though still much larger than in health. It is now hard, prominent, white and opaque. The first and second stages of follicular inflammation may terminate by resolution.

The third and last stage of follicular inflammation is ulceration. In this case, the gland bursts, and its contents escaping, leave a deep depression in the mucous membrane, so that supposing the ulceration to occur in an elliptical patch, the unequal surface of the mucous membrane gives that part the appearance of being granulated. The appearance of the

ulcer, whether of the glandulæ segregatæ or aggregatæ, are very various; sometimes their edges are something elevated, or broken down, and their base covered with a putrid sanguis; at others the edges are perpendicular, as if made by a punch, while the base of the ulcer is clean, exposing the muscular or peritoneal coat, which in a few cases bursts, and the termination of the disease is then by peritonitis. When the action of the poison is at length worn out, the ulcer granulates and heals, but a depression remains, denoting its seat, and the imperfect reparation of the part.

It is uncertain whether the inflammation of the mesenteric glands, which so constantly accompanies the affection of the intestinal canal, be a consequence of the specific action of the poison, or results from sympathy. In general, however, the mesenteric glands, in connexion with the more slightly inflamed portion of the intestinal canal, are but slightly inflamed, while, on the contrary, in those portions of the mesentery which correspond with the most diseased portion of the intestines, the glands are greatly inflamed. They now acquire a magnitude equalling that of a large plum stone, are of a purplish red externally, greatly injected internally, and in a still more advanced stage, their contents are a bloody fluid, or pus. It is seldom they have been found ulcerated.

The stomach has been found by Louis to be more or less diseased in every other case. The cases he examined were all connected with follicular disease of the cæcum and intestine, and this proportion may perhaps be correct in that particular form of fever; but it is apprehended, that taking all the various forms of intestinal disease, that calculation is much too high. Inflammation of the stomach in fever is probably owing to a specific action of the poison, and not arising out of any extension by continuity, for there is frequently a large intervening space between the inflamed portion of the intestine and the stomach; neither does it appear to arise from sympathy, for in that case it must be found much more frequently diseased than at present: but what is still more conclusive, is that the stomach is sometimes the only portion of the alimentary canal diseased in fever.

When the stomach is the seat of disease in fever, the poison commonly induces either diffuse or ulcerative inflammation of the mucous membrane. The colour of this inflammation is a deep venous purple, which changes in a few minutes, after exposure to the atmosphere, to a bright arterial colour. The discoloured portion is also usually altered in texture, the villosities being broken down, and the surface more pulpy than natural ; the mucous membrane also is thickened, and its cohesion impaired, so that it is more readily detached, and in larger proportions than in a state of health. The inflammation is usually partial, occupying the convexities of the folds, or the great cul de sac, or the orifices of the stomach : occasionally, however, the stomach is one uniform dull red.

The diffuse inflammation may pass into the ulcerative ; but ulceration of the stomach is frequently found without any very sensible change from the healthy colour of the mucous membrane. The ulcers assume every variety of character ; more generally, however, they are small, and have a sharp edge and perpendicular side, as though made by a punch. They are most frequent about the pyloric orifice, and in the great cul de sac, but occur in every other portion. The alterations of the consistency, cohesion, and thickness of the mucous membrane, are similar in the ulcerative inflammation to those described as resulting from the diffuse inflammation.*

The parts next to the intestinal canal, which are the most important, if not the most frequent seat of the action of the typhoid poison, are the brain and its membranes. It has been calculated that in five cases out of six the functions of the brain are more or less deranged in fever, while in the sixth case, though the powers of the mind may be enfeebled, yet they are in no sensible degree perverted ; and even in those cases in which the delirium and general excitement show the functions of the brain to be most disturbed, still it has frequently happened that no trace of inflammation, or

* In the cases examined by Louis, the stomach was ulcerated in one-twelfth of the cases ; and in those by Andral, in ten out of ninety-two.

other alteration of structure, has been found in the brain or its membranes after death. Dr. Tweedie, who considers the various exciting causes of fever to be primarily on the brain and nervous system, states, that out of 521 cases of fever 114 only had well-marked symptoms of cerebral affection; fifty-four of these died, but in fourteen no trace of disease in the brain or its membranes could be found. The testimony of Andral is equally conclusive. He affirms, that there is no truth in medicine better demonstrated than that every nervous derangement may exist in fever, and no appreciable alteration of the brain or its membranes be found after death. "In a great number of cases," he adds, "the substance, so far from being injected, appeared remarkably pale, and this paleness frequently coincided with an equal want of colour in its membranes." And these opinions are supported by the experience of every practical physician.

The brain and its membranes, then, though frequently affected, are not constantly so. The science of pathology is not sufficiently advanced to enable us to determine whether simple injection of the brain constitutes inflammation of that organ, but we seldom find any more diseased state of the encephalic mass than that its cortical and medullary substance is loaded with a larger quantity of blood, or, technically speaking, has more bloody points than usual.* In all other respects its cohesion, firmness, &c. are healthy. Sometimes, however, a minute superficial portion of a convolution is found, softened probably in consequence of the inflammation of the membranes extending to the cortical substance of the brain.

* Louis carefully examined the state of the brain in twelve fever patients who had little or no delirium, and in twelve who had suffered severely from it, and the comparison he institutes is as follows:—

WITH LITTLE OR NO DELIRIUM.	WITH GREAT DELIRIUM.
In 4 some redness of cortical substance.	In 5 some redness of cortical substance.
In 1 inflammation of thalamus.	In 1 slight ramollissement.
In 1 slight softening.	In 1 injection of brain and membranes.
In 6 brain healthy.	In 5 healthy.

The membranes of the brain are much more frequently diseased than its substance, and appear to be the more specific seat of the action of the poison in fever. The dura mater is seldom diseased in this or in any other disorder; but the arachnoid and pia mater are liable to all the inflammations to which they are at any time subjected, as the diffuse, the serous, the adhesive, and the purulent inflammation; and all these different forms of inflammation are occasionally seen in the same subject. The comparative frequency of these inflammations is not determined, but the diffuse inflammation and the serous inflammation are the most common; and according to Chomel, they occur in the ratio of four of the former to seven of the latter. The diffuse or congestive inflammation is merely marked by a dryness of the surface, and by a considerable distention of the venous system of the arachnoid generally, which is sometimes so considerable as to cause an effusion of blood between the meninges. When serous inflammation takes place, its more common seat is that portion of the arachnoid which covers the superior surfaces of the hemispheres of the brain. In others the base of the brain is its seat, and in others the ventricles. When the portion of the membranes at the superior surface of the brain is the seat of this disease, as is most commonly the case, the fluid effused is always secreted by the inner surface of the arachnoid, and consequently the outer surface appears dull and opaque, owing to the serum deposited containing an excess of albumen, and thus having its transparency impaired.

The quantity of fluid effused varies from a drachm to an ounce or more. The deposition of lymph or pus is seldom in any considerable quantity in fever; but points of unorganized lymph or pus are occasionally seen between the lamellæ of the two membranes. Organization of the effused lymph has not been met with in fever, and perhaps never occurs in the membranes of the brain; at least Louis affirms, that having examined with much attention the cerebral membranes of more than 500 cases, he has in no instance seen adhesions between the arachnoid and pia

mater, either at the surface or in the ventricles of the brain. The pia mater, except a slight increase of colour, does not exhibit any morbid appearance in fever.

The organs next in order of attack are the lungs. The frequency with which the lungs are affected differs singularly in different seasons. Some seasons will pass with scarcely a single case of this tertiary action of the typhoid poison, while in others every case of fever will at its first onset show more or less affection of the lungs. This more particularly occurred during the years of cholera, when it was not unusual to see patients brought into the hospitals delirious, spitting blood, and suffering from great irritation of the intestinal canal. All attempts, therefore, to calculate the frequency with which this form of disease may occur, are but distant approximations to the truth. Dr. Tweedie found thoracic affections in 103 out of 521 cases. Louis * found the lungs healthy in fifteen cases, or in one-third of those examined. The poison may affect either the bronchial membrane or the substance of the lungs. In this country, judging from the hæmoptysis and the purulent expectoration so frequently met with during life, the bronchial membrane would seem to be the most frequent seat of disease. There is much difficulty, however, in determining the inflammatory conditions of this membrane after death, in consequence of their simulating the appearances caused by the last agonies of life; and Louis admits that the phenomena of the bronchial membrane in fever do not sensibly differ from those found in subjects that have died of other diseases than those of the lungs.

The substance of the lungs, though perhaps not so frequently affected as the bronchial membrane, is one of the seats of the specific action of the poison. The inflammations it excites are the serous, the adhesive, or the purulent; of these the serous is the most common, and it is not unfrequent to see the lungs, as they are removed from the body, streaming with a sero-sanguineous fluid. That state of parts which results from adhesive inflammation or hepatization, occasionally occurs. Louis states that he found it in seventeen cases, either in the

* De Gastro-Entérite, vol. i. p. 360.

first or second degree, out of fifty.* These affections are generally partial, occupying only one lobe, or a portion of a lobe. When the substance of the lungs is affected, it is almost unnecessary to add that the bronchial membrane is uniformly involved in the disease.

The cutaneous tissue is more constantly affected in typhus than the lungs ; but as its affections are of less moment, it will not perhaps be considered as improper to have given precedence to the latter. The skin is subjected to two different eruptions in fever, termed petechiæ and sudamina : it has also a great tendency, towards the close of the disease, to ulcerate in particular parts.

The frequency of the cutaneous eruptions varies greatly. They are not uncommon in every year, but in particular seasons they mark almost every case. In the Cork Hospital, out of 540 patients, 380 had petechiæ ; and according to Dr. Tweedie, the cases in the London Fever Hospital in June 1832 had them universally. The petechial eruption is more common than the sudaminal.

The petechial eruption most usually appears from the seventh to the ninth day, but it may occur at a much later period. This eruption consists of a number of spots of a dull rose colour, which disappear on pressure ; are of a round form, from half a line to two lines in diameter, and are but slightly salient. Their more common seat is the chest and the abdomen, and more rarely the thighs, arms, face, and back ; they greatly vary in number, but occasionally amount to several hundreds. This eruption does not appear in all the parts it attacks simultaneously, neither does it appear to follow any given order of progression. It consists of many different crops, whose duration is not always the same ; for in some cases they will disappear after two or three days, while in others they will last twelve or fifteen days. Chomel is of opinion that the same part may be affected by a succession of crops, each dying away at the end of three or four days. Two opinions are entertained of the nature of petechiæ—the one is, that it is an exanthematory eruption,

caused by the action of the poison; the other is, that it is a consequence of a dissolved state of the blood: the former, however, is the more probable cause.

The sudamina are small hemispherical vesicles, from a quarter of a line to a line in diameter, formed in the cutis, and filled with a serous secretion so transparent that when we look at them obliquely their appearance is most brilliant; regarded, however, in a direction perpendicular to their axis, they are so diminutive as frequently to escape observation. They are, however, always sensible to the touch; and on pressure being made, they burst, and the finger is moistened by the fluid they contain. This fluid, perfectly transparent when the vesicle is first formed, Chomel affirms becomes opaque after a few days, and no longer filling the vesicle, the cuticle shrivels, ruptures, and at length desquamates. This eruption is often seen, in the first instance, on the sides of the neck, in the axillæ, or the groin, and in many cases it is limited to these spots; in other cases, however, it covers the whole trunk, and in others the whole body. This eruption appears generally later in the disease than the petechial, and most generally about the middle or end of the second stage of fever.

The tendency which the skin has in the latter stages of the disease to ulcerate and mortify may be owing either to extreme weakness and the reduced powers of the patient, or to a specific action of the poison, and gives rise to many unpleasant and even fatal results.* The points which are most liable to be thus attacked are those on which the body principally rests when in a recumbent posture. The favourite position in severe cases of fever is lying on the back, and consequently it is the skin covering the os sacrum and the os cocygis which is the most commonly affected. Chomel has seen the heel and the occipital portion of the

* "In January, 1812," says Sir James Macgrigor, "fever made great havoc in all the general hospitals. At Ciudad Rodrigo, Dr. Neale informed me that the cases of typhus had almost universally mortification of the lower extremities, with livor and mortification of the nose."—*Medico. Chirurg. Trans.* vol. vi. p. 409.

scalp in a state of ulceration from this cause. When the patient lies on his side, the great trochanter is the part most prone to slough. These affections are the more formidable, as they usually occur late in the disease, and often destroy the patient after the more specific actions of the poison have exhausted themselves, and a fair hope might be entertained of his recovery. Such is an imperfect outline of the pathological phenomena of fever.

Symptoms.—The symptoms of typhus fever form a most complex problem. The action of the typhoid poison on the three great nervous centres producing disordered functions of the many parts they supply ; the occurrence, after a certain time, of structural lesions, which may take place either simultaneously or consecutively, or according to every assignable order—making the disease to be compounded of primary fever, of local symptoms, and also of sympathetic fever ; give such a multitudinous detail, that all that can be attempted in describing the symptoms of typhus fever is a most general outline.

The varying intensity of typhus fever has induced pathologists to divide this disease into typhus mitior, and typhus gravior. This division is convenient, and founded in nature ; but it seems proper also to add to it a subdivision founded on the different affections of the cutaneous tissue, and the arrangement of its varieties will then be as follows :—

Typhus mitior,	Typhus gravior,
Typhus mitior petechialis,	Typhus gravior petechialis,
Typhus mitior sudaminalis,	Typhus gravior sudaminalis.

The structural lesions of other organs or tissues than the skin afford no data for a further generalization, because those lesions are so frequently masked by functional derangements or local insensibility, that perpetual error would arise from the adoption of new species founded on them.

Typhus fever may be suddenly induced, or it may be slowly elaborated by a long train of preliminary symptoms ; and according to Chomel, the proportions are, that out of 112 cases, in seventy-three the invasion was sudden, and in thirty-nine only was it preceded by any preliminary symptom.

In the latter event, the symptoms are slight functional derangements of the brain, the chord and great sympathetic occasioning head ache, pains in the back and limbs, loss of appetite, nausea or vomiting, constipation or diarrhoea, together with slight rigours followed by an increase of temperature, and terminating with or without sweats. These symptoms have nothing peculiar, and consequently are not characteristic of typhus, and may merely indicate the existence of some ephemeral disorder, or else the approach of any acute disease whatever. They usually last two or three or more days, when some increasing, and others disappearing, those which are more particularly characteristic of typhus are established.

The phenomena of fever are supposed more particularly to consist in shivering, heat, sweating, and in an increased frequency of the pulse. These symptoms, however, though they may be all present, are frequently all wanting in typhus,—the rigours, for instance, are occasionally absent, the temperature of the body in severe cases is frequently less than natural, the sweats are at all times accidental, and the pulse in a few cases is preternaturally slow. The phenomena of typhus fever, therefore, must be sought in other than the group of symptoms that has been mentioned.

The most remarkable symptom of the typhoid poison is the extreme degree of prostration both of the moral and physical powers of life which it produces. This is so great that there are few patients who are not compelled to take to their beds on the first or second day of the attack—for they cannot take a step without falling, nor sit up unless supported ; and, even when in bed, are hardly able to change their position, or to assist themselves in any manner: this is the first stage of depression. As the disease advances, the prostration increases, so that on raising their arms many patients allow them to fall as in palsy, by the mere force of gravity ; and this is followed by subsultus tendinum, showing how feebly the nervous fluid is secreted, and how quickly exhausted ; and some will even pass their stools in bed, and evince no desire to be cleansed, so averse are they to all motion : this is the second stage of depression. The last

stage is marked by the gradual diminution of these symptoms and the patient's recovery, or else their increase, followed by his death. This great prostration cannot be accounted for by any alteration of the structure of the parts usually affected, for it exists from the very commencement of the disease: neither is it caused by the diarrhœa, for sometimes that does not exist; nor by pains in the abdomen, for they are infrequent; nor by head-ache, which is often wanting; nor by the state of the stomach, which is for the most part healthy.

The symptoms that have been mentioned are derangements of the chord; but the functions of the brain are equally depressed. Somnolency, in a greater or less degree, is almost universal. This symptom, inconsiderable perhaps at first, if it be not interrupted by delirium, increases, and at last amounts almost to stupor. It is most common to find patients aroused from it with difficulty, and relapsing into it on ceasing to be questioned. In this state their memory, though ordinarily correct, is slow; but their minds, though not perverted, are incapable of all intellectual exertion, and they lie indifferent to all around them, and even to their own situation. It is strange also, that although somnolent, they frequently complain of not sleeping; or if they do sleep, that it is unrefreshing and disturbed by disagreeable dreams. It will be plain, after this statement, that shivering, heat, sweating, and an altered state of the pulse, are minor symptoms, and of comparatively little moment in the phenomena of typhus; and that debility in no degree proportioned to the gravity of the lesions, and caused by the action of the poison generally on the system, depressing all the great sources of life, is the most striking phenomenon of the disease. This effect of the poison of course greatly varies in degree, being in some very few cases slight, while in others it seems sufficient to destroy the patient before setting up any local lesion whatever.

In the campaigns of 1812 and 1813, in the Peninsular war, typhus broke out among the guards. "The patients," says Mr. Bacot, "usually came into the hospital complaining " of chilliness, languor, and depression both of strength

" and spirits; their countenance was wan and melancholy,
" and the surface of the body unusually cold to the touch;
" giddiness of the head was a frequent complaint, and deep
" and constant sighing was an universal symptom. I have
" seen numbers of men," he adds, " brought into the hospital
" so attacked die in twenty-four or thirty-six hours after
" their admission, without a prominent symptom, insensible
" to every kind of stimulus, and never having had any
" increased vascular action or accession of heat from the
" moment of their attack to the hour of their death." In the severe forms of fever that prevailed during the years of the cholera Indica in this country, it was not unusual to see patients brought into the London hospitals, after only a few hours' illness, with an attack of typhus—their bodies cold, and covered with petechiæ, the pulse little excited, their face bloated and almost purple, their conjunctiva red—die in a few hours, or a few days, without any very prominent symptom, except perhaps expectorating a small quantity of blood from their loaded lungs. These patients were apparently destroyed by the great depressing action of the poison; no organic lesions of any moment being discoverable, on the most minute examination, after their death.

This depressed state of the powers of life is accompanied by certain changes in the secretions of the tongue, this organ being first white, then brown or black, and, in the event of the patient's recovering, again becoming white, and subsequently natural. As these states of the tongue are a very accurate measure of the degree in which the patient labours under the influence of the poison, it enables us to divide fever into three stages, each stage being marked by a different condition of the tongue. The first stage is marked by the tongue being coated with a white or yellowish mucus. The second stage commences by the formation of a central line of dark vitiated mucus, which divides the tongue from its base to its apex, and this dark line gradually extends itself on either side till the whole superior surface of the tongue becomes brown or black, while the salivary secretion being usually stopped, it almost

universally becomes dry, and sometimes chapped. The third stage is marked by the tongue cleaning and again becoming white, the sure indication of the patient's recovery, or else by its continuing black or brown, which, beyond a certain period, is the almost sure premonitor of his death. These stages are sometimes of an equal length, and in a twenty-one days' fever, for example, each stage may last a week. More frequently, however, they are of unequal lengths, and even one or more of them may be altogether wanting. For instance, if the disease be slight, the white tongue stage may last fourteen or sixteen days, or even the whole period, and the patient recover, without the tongue at any time becoming brown. On the contrary, when the disease is severe, the white tongue stage may last but for a few hours, and the tongue becoming brown almost immediately may continue ten, twenty, or thirty days, or nearly the whole course of the fever. The usual law, then, of the secretions of the tongue, is that they are first white, then brown or black, and then again they change to white. But this law is not without exceptions, for in a few cases the tongue will be found preternaturally red or clean throughout the whole disease, the latter stages being marked by its being more or less dry and chapped.

These states of the tongue, however, do not indicate any given organic or functional lesion, either of the brain or the alimentary canal; for it is equally white or covered with sordes whether those parts be or be not diseased: there are, however, some states of the vascular system which usually accompany them. In the first stage, or as long as the tongue is white, the pulse is generally full and strong, and seldom exceeds ninety to one hundred and ten, and the patient lies in no immediate danger. In the second, or brown tongue stage, the pulse is small, and its frequency increased to one hundred and twenty or one hundred and thirty, and the disease is now grave. In the third stage, the pulse either gradually returns to its natural standard, or else becomes almost countless—a mere vibration, and in this state the patient's case is generally hopeless. But even these states of the pulse are not without their exceptions, for in a few cases

the pulse has been counted as low as forty in all the stages of the disease, and only risen as the patient recovered. In a very small number of cases it will vary on different days, and sometimes in the same day; and from forty it will rise suddenly to one hundred and twenty, and after a few hours again relapse to forty. It follows from what has been stated, that as the patient seldom recovers without passing through the brown tongue stage, it is a law that the typhoid poison does not wear itself out, or else that the patient does not become insensible to its action, until it has produced the lowest state of depression consistent with human existence.

The symptoms of typhus, it has been stated, are compounded of those of the general depression, and of those to which the accompanying functional or organic lesions give rise; it will be necessary to add, therefore, those symptoms which denote the affections of the alimentary canal, of the brain, and of the lungs.

When the poison falls on the mucous membrane of the intestinal canal, it produces derangement of function or inflammation; but supposing the latter to be the case, we are not able to determine from the symptoms the constituent portion of the membrane which is affected, nor the particular seat, and only in a majority of instances even the existence of the inflammation. This difficulty arises from the absence of pain in a considerable number of cases of inflammation of this membrane;* so much so, that when posthumous examination has frequently shown the greatest extent of ulceration, no pain has been suffered by the patient during his life. This was remarkably the case in a lad of about eighteen years of age, who was brought into St. Thomas's Hospital, labouring under fever, and with the functions of his brain so disturbed that during the night he attempted to jump out of window. Considerable pressure was made on his abdomen, but he evinced not the slightest pain. He died, and on examination no trace was found of disease in the

* Louis states that pain was present in ten cases out of thirty, or only in one third part

brain, but most extensive ulceration of the mucous membrane of the intestinal canal generally. Pain, therefore, though occasionally present, is the exception rather than the rule in inflammation of the intestinal mucous membrane. When pain is present, however, its most usual seat is the ileo-cæcal valve,* often the epigastrium, and, in the smaller number of cases, every part of the abdomen; but it frequently requires much pressure over the inflamed part to make it sensible.

From the absence of pain, the supposed great pathonomic symptom of inflammation, the structural lesions of the alimentary canal are more usually inferred than proved to exist in typhus. There are other symptoms than pain which denote affection of the alimentary canal in fever, as disordered functions of the parts, and which may or may not accompany an inflammatory state. These are slight or considerable diarrhoea, meteorism, and constipation.

Diarrhoea is the law in fever, and prevails in a great majority of cases. Most patients are purged from the very first day of the attack in a greater or less degree, and many, unless it be checked by medicine, pass eight or ten stools or more in the twenty-four hours.

The nature of the dejections is peculiar, and in the great majority of cases they are darker in colour than in health, and usually contain large flakes of thickened mucus, which floating about, and deeply tinged with bile, appear like small portions of the variegated moss that grows on the tiles of houses. This form of diarrhoea is perhaps most common in those cases in which the follicles are more particularly the seat of disease. Frequently the stools are grumous, and, according to Louis, assume the character of coffee grounds, and, in a few cases, blood is passed sometimes in amazing quantities, filling the chamber vessels.

Another symptom is meteorism, or the effusion of air into the large intestine. This is prevalent in a greater or less degree in one half the cases, and when considerable it

* When the ileo-cæcal valve is inflamed, the pain is often referred to the epigastrium; according to the law, that a duct being diseased, the organ from which it is derived sympathises.

always marks a grave affection, and one generally fatal; and to this we may add an occasionally tense and strongly contracted state of the abdominal muscles. Still these symptoms do not necessarily denote inflammation, for, like diarrhoea, they may result from mere functional disorder.

Constipation was found by Louis to occur in three cases out of forty, and this symptom may or may not denote inflammation of the alimentary canal; for there is a degree of inflammation sufficient to stop the secretions, and to produce continued contraction of the muscular fibre, when constipation ensues as a consequence. But this symptom, as it may be caused by functional derangement, is not more conclusive than any of the former, and consequently it follows that inflammation of the alimentary canal has no determinate symptom, and is in many cases a matter of mere practical inference.

When inflammation of the intestinal canal is accompanied by pain, it has been stated that whatever part be affected, that sensation is usually referred to the epigastrium; and pain of that part and vomiting frequently exist even when the structure of the stomach is healthy. When the stomach, however, is inflamed, pain is by no means necessarily present more than in any other portion of the alimentary canal; indeed, it is often absent, so that other symptoms, consequently, than pain and vomiting are wanting to determine the existence of inflammation of that organ. In a few cases, but by no means universally so, these symptoms have been a constriction of the fauces, a difficulty of swallowing even fluids almost as great as in hydrophobia, and a most uncontrollable mental anxiety, not to be accounted for by the gravity of any other symptom present. When vomiting does occur, the matters vomited usually contain some bile, and are, therefore, generally green, but present no remarkable character; in a few cases blood to a considerable amount is thrown up. The symptoms of the disorders of the intestinal canal, as they afford no data to enable us with certainty to judge of the nature of the lesion, do not allow us to judge of the progress of the inflammation, supposing it to exist. There is one exception, however, to this rule. In

a few cases the ulcer of the stomach, or other part of the intestinal canal, penetrates so deeply, that the peritoneum becomes involved, and the viscus ruptures. This is always followed by peritonitis; and an insufferable pain, greatly increased on pressure, together with a small and rapid pulse, denote the sad catastrophe which has occurred, and the melancholy and inevitable fate which awaits the patient.

It is seldom, however, that this fever runs its course without greater complexity both of symptoms and of lesion; for the brain, or the membranes of the brain, or both, most commonly become, either simultaneously or consecutively, affected with the alimentary canal. In these cases, the symptoms which denote the state of those parts, will be added to those which denote the state of the abdomen; but the symptoms do not in a great number of cases enable us to distinguish between mere disordered functions and inflammation.*

Inflammation of the membranes of the brain may be divided into three stages, though some one of them may be wanting. The length and progression of these stages correspond for the most part with those of the general depression, while the phenomena incident to each will vary according to the peculiar idiosyncrasy of the patient. Of these idiosyncrasies or temperaments there appear to be two most conspicuous, which may be termed the active and passive temperaments. In the active temperament, the first stage will be marked by a state of excitement without delirium; the second stage by a state of active delirium; and the third stage by the consequences attending the mode of the termination of the inflammation. In persons of a more passive temperament, the first stage is marked by a state of somnolency, and an indisposition to be roused; the second, by a low muttering delirium; while the third stage will necessarily be denoted, as in the former case, by the phenomena resulting from the mode of termination of the inflammation. The active state is the only one requiring further elucidation.

The symptoms of the first stage are severe and constant pain in the head, occupying ordinarily the frontal region. The

* See page 50.

face, sometimes pale and sometimes red, is greatly expressive of the distress the patient suffers. The eye, haggard or brilliant, with its conjunctiva injected, is painfully sensible to light, and therefore frequently closed. The least noise is insupportable, and the patient is troubled with noise in the ears. His temper is altered, and his answers are short and fretful. This stage, then, of increased excitement, but not as yet of delirium, denotes diffuse inflammation of the membranes only ; and at the end of a period of time, varying from two to ten or more days, it terminates, and the second stage is ushered in by the patient becoming delirious. His delirium may assume every character, and be joyous or melancholy, furious or tranquil ; and in it the memory sometimes pours forth its images with a rapidity which renders it impossible for the mind to dwell on any of them, and the patient wanders from subject to subject ; in others, he incessantly recurs to the same theme, and to the same few words. At others, though the cases are few, the disease assumes every character of insanity, and if permitted, the patient confined in the strait waistcoat presents the extraordinary spectacle of being able, in typhus fever, to walk with strength about the wards :* more frequently, however, he is tractable, and then forms one of a joyous party, or else is overwhelmed by a countless multitude of sins, and terrified with all the imaginary horrors of the other world. The phenomena of this stage shew that the inflammation of the membranes has extended to the substance of the brain. The last stage, or that of effusion, commences by the active delirium changing to a mere muttering—by the powers of the body failing with those of the mind, so that although incapable of directing his actions, the patient no longer requires restraint ; a calm has succeeded to delirium, but subsultus tendinum, convulsions or contractions of the limbs, a dilated or contracted pupil, the senses lost to their usual stimulus, the fæces passed without consciousness, the urine retained or coming away involuntarily, denote the almost exhausted state of the nervous

* In general, even the most violent patients are incapable of effort, and are controlled by a very trifling exertion of force.

system, and consequently hopeless state of the patient, and the approach of the fatal catastrophe.

In this short history of the cerebral symptoms, it has been supposed that the delirium has run the usual course, and been slowly elaborated: but sometimes its attack is sudden, and comes on a few hours after the first invasion of the fever: this occurrence is often exceedingly dangerous, for the patient is usually seized in the night, and before any proper guard is placed over him. In these cases he frequently dreams of being pursued by wild beasts, or about to be assassinated by robbers, or that the house is on fire; and thus possessed, he furiously rushes to the window, and precipitates himself headlong into the street, and many lives are annually lost in this manner.

Should the poison now fall on the lungs, the symptoms denoting inflammation of these organs will necessarily be added to those of the brain and alimentary canal, though the latter have generally much abated at the time of this occurrence. If the disease be confined to the mucous membrane, the symptoms will be a short dry cough, accompanied by a mucous or purulent expectoration, and perhaps streaked with blood. Should the substance of the lungs be inflamed, and serous effusion take place, crepitation will be heard all over the chest in slight cases; while in severer ones the posture and countenance of the patient supine—supported by pillows—his eyes protruded from their sockets—his countenance swollen and livid—his respiration laborious, with loud tracheal rattle, sufficiently denote the nature of the lesion the lungs have sustained. Such is a very general analysis of the symptoms of this formidable disease; to attempt to describe them more distinctly would be as endless as to depict the individual forms of the botanical kingdom. It is necessary to add, however, that typhus petechialis and typhus sudaminalis in no respect differ from the simpler forms of typhus; the eruptions characteristic of those species neither aggravating nor mitigating the disease.

Diagnosis.—The diagnosis of the first stage of typhus cannot be determined during the few first days of the attack. The

fever that precedes the eruption of small-pox, measles, and other eruptive disorders, in no respect differs from the first stage of typhus. There are also many slighter diseases, arising from the action of more ephemeral poisons, as a common cold, or else from some local irritation of the intestinal canal, or other part, which for a few hours may simulate the first stage of typhus. In forming a diagnosis in typhus the ordinary remedies must be tried, and the period which usually precedes eruptive diseases be allowed to elapse before we can determine its existence; but if the fever still continues unabated, there can be no doubt the disease in question is typhus.

The phenomena of the second and third stage of typhus is simulated by many local diseases—as abscess of the liver, a sloughing sore, gangrene even of a small portion of cellular tissue: in fact, most diseases terminate more or less with symptoms of the last stage of typhus. So, that when the tongue is brown, the previous history of the disease must always be inquired into before we can affirm with certainty that the existing disease is typhus.

Prognosis.—The prognosis in typhus is always grave, and there are few diseases that destroy so large a proportion of the persons attacked. In France, out of 138 cases given by Louis,* 50 died, or more than 1 in 3; out of 134 cases given by Andral, 45, if not 53, died, or nearly the same proportion; Chomel states, that out of 207 cases treated at La Charité and at the Hôtel Dieu, 71 fell, or more than one-third; that out of 57 treated on his own plan 13 died, or 1 in 4½; Dr. Bateman states that the mortality at the London Fever Hospital varies in different years from 1 in 12 to 1 in 6;† but the records of that establishment, from 1802 to 1828 inclusive, gives 7093 admitted, of which 1064 died, or less than 1 in 7;‡ and this, perhaps, is the largest number of recoveries usually obtained in this country under any mode of treatment; and taking the calculations altogether, they leave but a small number of chances in favour of the persons unfortunately

* De Gastro-Entérite, vol. i. p. 9.

† Bateman on Contagious Fever, p. 79.

‡ Tweedie, Clinical Illustration of Fever, p. 15.

seized: and, consequently, the prognosis is grave in every case of typhus fever.

It is estimated that children under twelve years of age recover in much larger proportions than adults; that adults from fifteen to forty-five recover in nearly equal proportions; and that from forty-five to old age the chances of recovery diminish with the advance of years. The difference of sex does not appear to add additional chances.

The predisposing circumstances have some influence over the course of the disease; and it is considered that the poor man has in general a better chance of recovery than the more affluent person. The cause of this has been supposed to be the greater cerebral activity of the wealthy and educated classes.

The mode in which the disease makes its attack appears to influence the result. Out of seventy-three suddenly attacked only twenty-six died: out of thirty-nine preceded by a series of preliminary symptoms, twenty died.*

In forming our prognosis, the position of the patient is important:—while the disease is severe, the patient lies on his back; on a favourable change, he turns on his side.

The state of the brain is of much moment. When it is affected early in the disease the fever is more critical than when it sets in later. A state of somnolescence is more favourable than active delirium; active delirium than mania; stupor, or that state in which the patient's attention can be roused, is much more favourable than coma, in which the patient lies a stranger to all external excitement. He often recovers from the one, but rarely from the other. The affection of the sight termed *muscæ volitantes* is always a fatal symptom; deafness is seldom a grave symptom; but preternatural acuteness of hearing is always so.

Affections of the muscles, as *subsultus tendinum*, are nervous accidents, which, as they mark the degree in which the brain labours under the poison, are always unfavourable. If slight, they are of little moment; but if constant, there is little hope of a happy termination. A contracted state of the muscles

* Chomel, *Leçons de Clinique Medicale*.

of the abdomen, or a rigid spasmodic contraction of the muscles of the limbs, are equally unfavourable symptoms. Affection of the sphincter muscles is also a grave symptom ; and patients more frequently recover that pass their fœces involuntarily, than those who are troubled with a suppression or non-retention of urine.

A white state of the tongue is always favourable ; a brown state of the tongue always marks a severe form of the disease, but is not by any means a fatal symptom, unless other circumstances be present.

A tympanitic state of the abdomen is always grave ; when slight, it may pass off in a few hours, and the patient recover ; but if it persists, it is always a fatal symptom.

Hæmorrhage from the nose, when the patient is relieved by it, is a favourable sign.

Hæmorrhage from the bowels or stomach is always a grave symptom. Chomel (p. 439) states, that out of seven cases treated at the Hôtel Dieu with this symptom, only one recovered.

The occurrence of peritonitis is always fatal, as it denotes rupture of the alimentary canal.

Vomiting of bile late in the disease is generally favourable.

It has been stated the pulse greatly varies in fever, that it has been counted as low as forty, and that from forty to sixty cases are not uncommon. In one of these cases of slow pulse the patient died, and effusion between the membranes of the brain was discovered ; but as the greater number recover, it probably in most instances only marks functional derangement. The pulse in some cases will vary in a few hours from 40 to 120 ; and these are always long, tedious, and critical, but not necessarily fatal.

Rigors occurring on the decline of the fever do not necessarily forebode the attack of inflammation in any organ, and are frequently the forerunner of a return to health.

It is always more favourable that the temperature of the body should be above than below the natural standard of health.

Profuse perspirations seldom benefit the patient. Inflam-

mation of the lungs is always a grave symptom; but the patient generally recovers when it is confined to the bronchial membrane.

If a sloughing sore appear on the nates, great trochanter, or other part, the recovery of the patient will depend on the intestinal canal having so far recovered its powers as to enable the patient to take a sufficient quantity of nourishment; if not, the disease is fatal. The danger incident to the supervention of erysipelas will depend on the same circumstance.

Treatment.—The treatment of fever is divided into the curative, the dietetic, and the preventive treatment.

The curative treatment of fever embraces three great questions: first, Is there any mode of arresting the fever immediately on its formation? Again, Is there any antidote to the poison? And lastly, If medicine is not capable of accomplishing either of those objects, what is the mode of treatment the most successful?

It has been thought possible to arrest the progress of typhus immediately on its formation by the employment of cold affusion, or the exhibition of emetics. The use of the cold bath in fever is of extremely ancient date; but its use in modern times was more particularly revived by Dr. Currie, who, in his Medical Reports, affirms, that if cold affusion be used before the third day, it generally, if not universally, stops the fever. The grounds on which Dr. Currie based this opinion were those of experiment; and his work contains many supposed instances of its successful employment. The experiment, however, has failed in the hands of most other physicians, and has rendered it probable that the prevalence of the Brunonian theory in Dr. Currie's time, and the practice it inculcated, created a necessity for this particular mode of treatment, which does not otherwise exist. The two following cases given by Dr. Currie are instances of this:—To a patient ill of fever there was administered, on the first day of the attack, an emetic of antimonium tartarizatum, which did not stop the fever. For the five following days, the remedies were Dover's powder, in small but frequent doses—a medicine, which contains a considerable portion of opium, and this

was alternated with a decoction of yellow bark and sulphuric acid; and to these powerful stimulants were added beer, and wine, and opium. The second case was attended by Dr. Currie himself. It was that of a boy about ten years of age, the son of a friend, and dangerously ill of fever. His nights were sleepless, and opium had been administered in vain, to quiet the general irritation :—“ I determined, therefore,” says Dr. Currie, “ to give it in larger doses, and to watch its effects.” At ten o’clock at night, then, he gave forty drops of laudanum to this child of ten years old, and at twelve o’clock the same dose was repeated. “ As I stood at his “ bedside, two hours afterwards,” says Dr. Currie, “ he ap-“ peared in an imperfect and agitated sleep—his eyes half open, “ his face livid, and his lips and skin parched. He moaned in “ his sleep, had tossed the bed-clothes off his feet, and grasped “ the cold bed-post with one of his hands.” Dr. Currie now applied cold ablution, and we feel no surprise that it was attended with a mitigation of the child’s sufferings.

When, however, the necessity for cold affusion has not been artificially created, the practice has seldom been beneficial. Dr. Bateman had an opportunity of using cold affusion, as early as the third day, in two cases,* and it not only failed to arrest the course of the disease, but did not contribute, apparently, to abridge it. In the hands of Dr. Rogan also, who used it extensively in the north of Ireland (p. 33), “ it rarely succeeded in cutting short the attack.” Dr. Tweedie (p. 191) had an opportunity of seeing it decidedly and boldly administered in the Edinburgh Infirmary, by Dr. Home.—“ It “ was always a remedy that gave great alarm to the patient, “ and the shock was in many instances injurious, especially “ when the powers were naturally feeble. I never witnessed “ the fever extinguished by it, nor, as far as I was able to “ judge, was its course even shortened.”

Dr. Little says: “ The cold affusion I have tried in private “ practice, and under the most favourable circumstances, and “ I cannot say that it was by any means so successful as “ others of a safer kind, and, at the same time, of easier

* Bateman on Contagious Fever, p. 95.

" application. During the winter season, I think cold affusion should never be employed, nor even during spring and summer when easterly winds prevail, lest inflammation should be excited in some important internal organ." Cold affusion, therefore, has, by most physicians of the present day, been laid aside, and the sponge substituted for the shower-bath. The use of the latter is attended with inconvenience, fatigue, exposure, and alarm, and produces little more than the temporary alleviation of certain symptoms, which the use of the sponge equally effects.

If we turn from this empirical practice of cold affusion to the great and leading doctrine of fever, which attributes this disease to the action of a morbid poison, it will be plain, if that hypothesis be correct, that cold affusion could not interrupt the course, though it might modify the symptoms. A poison circulating with the blood cannot be removed from the system by ablution of its surface. No person expects to stay the course of small-pox, of scabies, or of syphilis, by a similar application. We might, therefore, have predicated, *à priori*, that cold affusion could not remove from the body the poison of typhus fever, and consequently had no power to stop the course of the disease, though it might modify the symptoms.

Emetics have been given from the earliest times with a view to stop the progress of fever, founded on many fanciful hypotheses. Lind and Huxham imagined that the contagion of fever impinged on the mucous membrane of the stomach, and that an emetic, by cleansing the contaminated membrane, would prevent its absorption, and consequently the disease. Dr. Currie thought that the concussion given by them to the whole system dissolves the morbid concatenation, and terminates the disease. Dr. Bateman imagined them to act by a direct sympathy between the skin and the stomach, a state of nausea, equalizing the circulation, and determining the blood to the surface. The evidence, however, of many practical physicians against the use of emetics in fever, is extremely strong. De Haen says he never prescribed a vomit with benefit to the patient in the whole course of his long practice.

Dr. Rogan states (p. 32): "Soon after the opening of "the Temporary Fever Hospital I left off the use of emetics "as general remedies, having observed that the patients "received into that establishment recovered as speedily, and "even in a greater proportion, than took place in private "practice." Dr. Bateman says, in two cases only did this practice put an immediate stop to the febrile symptoms (p. 93). Boisseau adds, that he has a thousand times seen emetics administered in adynamic fever, and the fever has been almost always increased, and the patient has fallen if they have been persevered in. Fordyce says, antimony produces its best effects when it does not produce sickness; and Broussais exclaims, "What can we expect from exhibiting emetics when the gastric surface is inflamed!—the patient cannot escape this species of poisoning."

The laws of the typhoid poison certainly do not render it probable that the mucous membrane of the stomach is the sole, or even the usual, means by which that agent is absorbed. The contagion most generally exists diffused through the atmosphere, and, in all probability, is absorbed by the bronchial membrane. A few inspirations of carbonic acid are sufficient to cause death, although the patient be immediately brought into the open air—so instantaneous is the absorption of that poison by the lungs. Supposing, however, the typhoid poison to be introduced by the stomach, still in no case is an emetic administered till after the symptoms of fever have appeared, and, consequently, not till after absorption has taken place, and the period of latency passed. There seems but little ground, therefore, for believing that an emetic can, under any circumstances, be useful in stopping the disease. The use of emetics is certainly not so prejudicial as is affirmed by Boisseau and Broussais; but their beneficial consequences are at no time striking, and there are cases in which the most distressing vomiting exists throughout the whole course of the fever, and without the slightest mitigation of the other symptoms. The use of emetics, therefore, supported neither by theory nor by practice, will be abandoned, as far as relates to the accomplishment of this

object, as soon as the public mind becomes sufficiently enlightened to allow the profession to use a wise discretion.

No mode of treatment having been discovered by which the disease can be terminated on its first formation, do we possess any antidote or specific remedy to the poison? Bark, calomel, and perhaps the hydriodate of potash, are the only remedies known to possess any specific character; and the two former, after a most fair trial, have entirely failed. Morton tells us that bark was of no use in the continued fever of his day. Fordyce says bark has been employed to prevent the *occurring* of continued fever, but that it seldom had had that effect; and when it fails, it increases the affection of the head and breast, so as to endanger the life of the patient. Boisseau says it is sufficient to have observed fever attentively in the hospitals of our armies to know that bark has not diminished the number of the dead. Serres and Petit state, that, considering the seat of disease, they thought that stimulants of difficult solubility, and of easy absorption by the stomach, might act indirectly on the inflamed cæcum; they therefore prescribed, though late in the disease, the infusion and tincture of bark, but they lost a large number of patients. Louis treated several cases of fever, in different stages of the disease, with bark, but he lost one in three. Andral also treated forty cases* with tonics, and of these bark was the principal; yet in twenty-three he found the fever aggravated. Bateman says:†— “It were to be wished “that this substance were erased for ever from the catalogue “of medicines employed for the cure of this disease. In the “early part of my practice, agreeably to the doctrine of the “times, I resorted to the decoction of cinchona on the first “appearance of langour and debility. The increase of the “symptoms was easily imputed to the intractable nature of “the disease, or deemed the necessary result of its progress, “until it became obvious, from the repeated occurrence of “the fact, that the tongue, which had been, on the day “before the administration of the bark, moist, and exhibiting

* Clinique Médicale, vol. iii. p. 654.

† Contagious Fever, p. 128.

" a grey or yellowish mucus, was, on the following morning, dry, or even brown; that the skin was hotter and more parched, with a flush in the cheek; that the pulse was harder and quicker, the thirst increased, and the sleep more disturbed. That these are the effects of cinchona in the fever, which I have had occasion to treat even when the patient has made some progress towards recovery, so long as any fur continues to whiten the tongue, I have had such manifold proofs, that I have of late scarcely ever prescribed it even during the state of convalescence, having again and again witnessed a return of head-ache, with the concomitant symptoms of irritation during that state, on the commencement of the use of the medicine." A case was treated by bark some years ago in St. Bartholomew's Hospital, in the first stage, but the patient died in a few hours phrenetic. A patient in a very early stage of the fever, and with a white tongue, was treated by five grains of quinine every six hours, in St. Thomas's Hospital, and he recovered, but only after large and repeated applications of leeches to the abdomen. The use of quinine in the latter stages of fever is not uncommon in this country; but it is difficult to point out its advantages over almost any other tonic. A few doses occasionally are of service, and rouse the patient, but, unless the quinine is withdrawn at this point the fever almost uniformly ends fatally; indeed, the entire abandonment of this medicine seems desirable in attempting the cure of typhus. We know that in paludal fever bark loses its specific powers almost as soon as the more specific inflammations are set up. It is therefore difficult to understand on what ground bark or quinine can be of use in typhus, in which inflammation of the intestinal canal forms the great characteristic feature of the disease.

The evidence against the salts of mercury possessing any specific powers in typhus is not so great as that against the use of bark; but the experience of its warmest advocates is so contradictory as to show that it is only an occasional, and by no means a specific remedy. Dr. Fordyce says, " Mercury has been employed in all cases of fever, of an ordinary degree of

"intensity, whether continued or intermitting, without any sensible good effect either in producing a crisis or occasioning a more powerful relaxation, or shortening of the course of the disease." Dr. Cheyne states, that during the epidemic in Ireland, "calomel and opium did not answer my expectations; a course of calomel and opium is very apt to leave the patient excessive weak, and it very generally affects the mouth; and by this combination were produced some of the most severe ptyalisms I have ever witnessed. With regard to blood-letting, mercury, opium, and wine, I beg to remind the young practitioner that they are remedies only applicable in particular cases." Of those gentlemen who are advocates for the use of mercury, how opposite are their opinions! Dr. Bright, of Guy's Hospital, strongly recommends the use of the hydrargyrus cum cretâ. Dr. Burne, of the same school, says, "I know it is the practice of some very excellent physicians to prescribe the hyd. c. cretâ during the existence of the ochre-coloured diarrhoea; but I have generally seen the diarrhoea subside sooner when mercurials have not been resorted to; and further, I have repeatedly witnessed this diarrhoea to be aggravated and protracted by the hyd. c. cretâ, to the manifest injury of the patient."^{*} Dr. Burne, however, while he deprecates its being given internally, is a strong advocate for the external use of mercury; the average quantity to be rubbed in being half a drachm of the ungu. hydr. fort. twice a day. But Dr. Tweedie, of the Fever Hospital, says, "It is important if possible to avoid the full mercurial action, because when this occurred I observed that great weakness ensued, which tended to render the convalescence exceedingly tedious, and often imperfect. I have also occasionally witnessed very troublesome sloughing of the mouth, and even perforation of the cheek, which ultimately proved fatal from the administration of mercury to children in fever."[†] Several cases have been treated in St. Thomas's Hospital with greater or less doses of mercury. In a very few instances the fever has subsided on the patient's mouth becom-

* Burne on Typhus, p. 190.

† Tweedie, Clinical Illustrations of Fever, p. 187.

ing sore; but several patients have also died, the mouth being yet affected; and as a general principle, mercury has shown no specific effect in the cure of fever, and most practitioners continue to use it either as a purgative or alterative medicine, and for the purpose of improving the intestinal secretions, but it must be admitted with doubtful effect. Such conflicting evidence plainly proves that the exhibition of mercury has not diminished the mortality in typhus, and that its entire abandonment would in no case lessen the chances of the patient's recovery, but, in many instances, might perhaps increase them.

The antidote to the poison of typhus, if it exists in nature, being undiscovered, what is the best mode of treating this formidable disease? In typhus fever there is almost uniformly present in the first stage a full pulse, an increase of temperature, considerable head-ache, inflammation of one or more organs of the body; and the blood also, when drawn, exhibits a buffy coat: all circumstances which would seem to indicate the necessity of the strictest antiphlogistic treatment, and even of large blood-letting. On the contrary it is affirmed, admitting all these circumstances, that they are caused by the action of a poison; and, although a strict antiphlogistic treatment may be necessary, still that large bleedings, as a principle of treatment, being contrary to all the known laws of poisons, would only lay the system more powerfully under its influence, aggravate all the phenomena, and prove in the highest degree injurious. The question, then, of the propriety of bleeding in fever, or of abstaining from it, is one of the highest importance, and in the present state of medicine it is hardly possible to collate to too great an extent authorities in order to show on which side the preponderance of evidence most chiefly weighs.

Sydenham was a humoralist, and held, that instead of putrid bile, fermentation was the cause of fever; and observing that liquids in a state of fermentation acquired an increase of bulk, thought that the first step in the cure of fever, and "not "to be omitted without danger, lest delirium, phrensy, and like "disorders, might arise from too great an effervescence of the "blood, but also lest the circulation might be obstructed, or the "whole mass in a manner stagnate from its excess in quantity,"

was to bleed. What was the success of this practice Sydenham no where tells us, but we read of the black tongue, and of the fever running on to forty days. He feared to give a harmless glyster, and in the only case he reports at any length, he states that having twice bled the patient, he wished to bleed a third time, when the friends of the patient interfered, and a few hours after the poor lady died.

Huxham, although a humoralist, adopted also the doctrine of the mechanicians. He reasoned, that as the friction of two pieces of iron or wood produced heat, so the friction caused by the rapid circulation of the blood against the coats of the blood-vessels produced the heat of fever. He therefore bled largely to reduce the circulation ; and in his work we read of the tongue of his patients being vastly dry, and stiff, and black ; of urine black and foetid, of horribly offensive stinking breath, and of black, dun, or greenish petechial spots appearing on the body. In one case he relates that “the blackness reached almost to the very elbows. The patient, a woman, died, but an intolerable stench arose from her body at least forty hours before her death, though kept clean with all possible care.” This picture is in all probability much overcharged in the colouring, but it unquestionably shows that bleeding was not a successful mode of treatment in the hands of Dr. Huxham.

Sir John Pringle, who did not permit his theories to interfere with his practice, says, “many have recovered without bleeding, but few who have lost much blood.” Dr. Lind says, in respect to bleeding, that operation is always dangerous in proportion to the violence of the taint. Fever highly malignant will not bear bleeding. Dr. Carmichael Smyth says,—“I must protest, as far as my feeble voice may go, against the use of the lancet in jail and hospital fever.” Dr. Fordyce, who had great opportunities of determining this question, states, that when he began the study of physic Boerhaave’s doctrine was the fashion of the day. This doctrine taught that it was difficult to diminish the strength at the beginning of a fever, and easy to support it afterwards. This proposition led to the practice of bleeding in fever ; and blood followed, says Dr. Fordyce, “as though it was an oblation at a solemn sacrifice, as the seal

of the bond ;" and—" this practice, while it lasted, destroyed more men than fell in battle during two dreadful wars that raged within that period in Europe." Mr. Hunter,* also, gives his powerful testimony against the practice of bleeding ; " for I remember," says he, " when practitioners uniformly bled in putrid fevers, but signs of debility and want of success made them alter their practice."

The writers on medicine of more recent date have not in general been more fortunate in their experiments with the lancet in fever than their predecessors. Boisseau says, fever arising from gastro-enterite is seldom diminished by general bleeding. Dr. O'Brien says, " In some late instances I have " carried blood-letting to the utmost verge of safety and of " prudence : I mean to an extent generally sufficient to effect " a cure of the phlegmasiæ ; and I have never been able to " effect more than a mitigation of the symptoms. In fever, " the laws of the phlegmasiæ are totally different from those of " simple fever." Andral's authority is great, and equally unfavourable to the practice of bleeding in fever : for he bled seventy-four individuals in typhus, but thirty-five died ;† and of this whole number of seventy-four persons thus treated either by local or general bleeding (p. 631), in sixteen only was there any notable amendment, and in three of these the amendment disappeared on repeating the bleeding ; while in twenty-four all the symptoms were aggravated. The loss of blood also, he observed, was frequently followed by that fatal symptom, meteorism, and never removed it, (p. 639), and in seven cases only were the many troubles of the " innervation" mitigated, while in fifteen they were immediately aggravated. The accuracy of Louis is certainly greater than that of any living pathologist; and he tells us,‡ that of fifty-two cases that died of fever, thirty-nine were bled a greater or less number of times,—certainly not a favourable result ;—and that the course of the disease was more fatal and rapid in proportion as the first bleeding had been large, and practised at

* Hunter on Inflammation, p. 227.

† Clinique Médicale, vol. ii. p. 627.

‡ Gastro-Entérite, vol. ii. p. 160.

the earliest period of the disease.* He also adds, that except in three cases the delirium either underwent no change, or came on the same night, or the next day after the bleeding, (p. 465,) or it became more aggravated. This perseverance or this augmentation of the cerebral symptoms occurred in a large number of the cases. Neither was the amelioration of the abdominal symptoms more marked. The diarrhoea was diminished only in three cases, and continued or was increased in all the others. The pain of the abdomen was diminished in none, and in one was augmented twenty-four hours after the bleeding ; and when meteorism was present, bleeding in no case relieved that symptom. Cruveilhier adds his testimony also, that in many cases in which bleeding has been immoderate, the local symptoms have been rendered worse, and the patients have rapidly died ; and he concludes that the enterite folliculeuse aiguë ought not to be treated after the manner of diseases essentially inflammatory. Such is the strong evidence we possess against the practice of bleeding in fever.

The evidence in favour of the practice of bleeding is not of the same amount, neither is it of the same value. Dr. Clutterbuck is among the first who attempted to revive the practice of bleeding in fever. He considers the disease to be essentially inflammation of the brain, and bleeding to be the rule of treatment. The quantity of blood to be drawn to be in the inverse ratio of the duration of the disease. In support of this methodus medendi Dr. C. gives fourteen cases treated by severe depletion, and in some cases exceeding sixty ounces of blood, but of these cases three died, and in one the disease ran on : a mortality certainly evidencing no remarkable success. But much difficulty exists as to the admission of the cases, for in all he bled early in the disease, and in one instance within six hours after the attack, a period of time too short to allow the most discriminating physician to determine between fever and those many ephemeral febriculæ which simulate the first symptoms of typhus. Dr. Armstrong followed in the train of Dr. Clutterbuck, and it is

* Vol. ii. p. 462.

apprehended with no better success ; and in his last published work (his Lectures), it is impossible to understand either his system or his treatment of fever. Dr. Bateman is an advocate for early bleeding ; but it does not appear that he practised it on any sufficient scale to form an opinion about it. Dr. Tweedie and Dr. Southwood Smith are among the latest advocates for bleeding in fever ; and their data are derived from an extensive experience at the London Fever Hospital. They state that they treated 521 cases of fever ; that seventy-three deaths occurred, or nearly one in seven ; yet out of this large number, only forty-two* were typhus. Without pretending to understand the distinction drawn by these physicians between typhus and continued fever, it will be plain, that if any very beneficial effect could result from bleeding, the theory and practice of Dr. Southwood Smith must have led to much happier results than are denoted by the mortality of the cases ; for his doctrine is, that in fever we know that inflammation is at hand, and we know what will prevent it, or at least what has a powerful tendency to prevent it. “ The physician in the first stage of fever, armed with his lancet, “ is to his patient what the fireman with his engine before “ the flames have had time to kindle is to a building that has “ taken fire. Bleeding in fever cannot be performed too “ early. If inflammation has come on, not a moment is to be “ lost ; mere relief from inflammation is nothing ; the ab-“ straction of blood must be carried to the degree of subduing “ inflammation. There is no limit to the quantity to be “ taken. If after the abstraction of 16 ounces the vascular “ excitement be not completely subdued in the course of “ three or four hours, the same quantity must be again taken ; “ and if not subdued by this, a vein must be opened next “ morning, and blood allowed to flow till the pain, wherever “ seated, be entirely removed ;” and that he carried out this theory to its fullest extent is manifest, since from one patient, Dr. Dill, he abstracted 120 ounces, and that gentleman happily recovered. Dr. Tweedie, although an advocate for bleeding in fever so much that 20 cases (p. 171) lost blood gene-

* Tweedie, p. 193.

"rally or locally," yet he adds, (p. 193), "of the forty-two cases of typhus fever, only one was bled from the arm. As a general rule, this form of fever neither requires nor bears phlebotomy: there is more functional than vascular disorder, with tendency to sinking of the powers; hence topical inflammations are best treated by local bleeding and blisters."*

Since, then, the evidence against bleeding in fever so greatly outweighs that in its favour, it seems demonstrated, and by the most extensive practical experience as yet before the public on any disputed medical question, that bleeding in the cure of fever is the exception and not the rule; and although that operation may be occasionally useful, it is only as a mode of treatment, and applicable to particular cases.

* Dr. Little, of the Belfast Hospital, takes a similar view of the effects of bleeding in fever, and speaks from practical experience of its injurious effects. "I have not seen a single case of genuine contagious fever, where the loss of blood appeared to diminish its duration. On the contrary, I have seen many cases where depletion to the amount of twelve or sixteen ounces had the most decidedly injurious effects. As blood-letting is seldom employed in the Belfast Fever Hospital, it is more particularly amongst those patients who have been treated for some time in their own habitations before their admission that its injurious effects are fully manifested. Amongst some of the bad effects resulting from the loss of blood, I may mention delirium, muscular tremors, and restlessness. I have, in several instances, seen delirium succeed almost immediately to the loss of blood; and when this occurrence took place, I have very seldom known the patient recover. When any of the more important internal parts suffer from inflammatory action during the progress of contagious fever,—a thing, as I have already mentioned, of very rare occurrence,—the abstraction of blood, by means of the lancet, to such an extent as would be perfectly safe and absolutely necessary were the inflammatory action not complicated in this way, would, in cases where febrile and inflammatory action are blended together, be productive of the most dangerous effects."—*Dublin Journal, March, 1835.*

And he adds:—

"From what I have observed respecting the spreading of fever, I would certainly maintain that it is a disease very infectious in its nature, but more especially when the system is in a weak state at the time of exposure. To show how much poor living, accompanied with great bodily fatigue, favours the spread of fever, I may instance what occurred in the Belfast Hospital amongst the nurses when their allowance of food and drink was not by any means so generous as it has been for some years past. There never was a year that several of the nurses had not one or more attacks of fever while their fatigue was great and their living was poor; but since the food and drink became more generous, it is a very rare thing indeed for them to become affected."—*Dr. Little, Belfast Dublin Journal, March, 1835, p. 41.*

From the preceding investigation, it has been proved that at present we possess no antidote to the febrile poison;* neither any agent sufficiently active to prevent the absorption of the poison, nor after its absorption to remove it from the system. It has likewise been demonstrated, the laws of fever so far differ from those of the phlegmasiae, that as a general principle it may be affirmed, bleeding, which cures the latter, is not only not beneficial, but decidedly injurious in fever. It is plain, therefore, we possess no absolute means of cure in this disease, and that our attempts to benefit the patient must be rather directed by rules drawn from the study of the laws of the disease, and by the employment of those modes of treatment which experience has shown favourably to influence their phenomena; for no mode of treatment can possibly be successful, which is at variance with those laws, or with those of poisons generally. Guided, however, by this knowledge, the medical art is of the greatest value, for it is calculated that the febrile poison is so nearly balanced against the powers of the patient, that, without the aid it affords, every other case would terminate in death.

The great laws of fever that should guide us in the treatment of this disease are, first, that it has a course to run; and secondly, according to the idiosyncrasy of the patient, or the particular modification of the poison, that there is a series of local inflammations to be set up, as in the case of scarlet fever, measles, or small-pox, inflammations which it is probable no art can prevent, and which, when moderate, render the disease both milder and safer than when the inflammations are trifling, or altogether wanting; and lastly, that the general as well as the specific actions of the poison are greatly increased by unnecessary depletion, and by whatever weakens and debilitates the body. The rules of treatment which follow from a consideration of these laws are both negative and positive. The negative are not futilely to attempt, with our present limited means, to stop the fever, and more especially by bleeding, which only the more predisposes the patient

* Dr. Baillie says: "In these fevers I have met with no remedies which possess any specific powers of cure, or which are capable of shortening in any material degree their duration."—*Posthumous Works*, p. 238.

to the action of the poison ; neither ignorantly to treat the patient by active measures in anticipation of the occurrence of any of the accustomed inflammations ; for it is plain, from the phenomena of syphilis, that no medicine will act on the poison while yet latent, though it may control and mitigate its actions after they are set up.

The positive rules of treatment are not to anticipate any thing in fever, but to await the occurrence of each particular symptom ; and inflammation being set up, to remember that it bears a specific character, and that we might as well attempt to stop the small-pox eruption as to impede its course. All, therefore, we can effect prior to the inflammation is to remove all those causes which may irritate, and consequently predispose any organ liable to be affected ; or supposing the inflammation exists, to remain satisfied with so moderating its intensity, that the life of the patient may not be endangered by this particular affection ; and beyond this, medicine has at present no power, except to stimulate those secretions which are in defect, and to restrain those which are in excess.

The attempt to cure fever by antimony, ipecacuanha, or any of the many other of the large class of diaphoretics or purgatives, and where there is no particular indication to be met, is now considered to be an useless practice, or only calculated to amuse the mind of the patient. Let us therefore, looking to the rules that have been mentioned, suppose the fever to be established, and that the poison has, or is about to set up its great specific action on the mucous membrane of the intestinal canal ; what is the mode of treatment to be adopted ?

As a general principle, there is no known symptom that marks the point at which disordered function of the mucous membrane of the intestinal canal ends, and alteration of its structure begins. It is necessary, therefore, in all cases in which the disease has existed but a few hours, to assume, that inflammation of some portion of the alimentary canal does exist ; an assumption which, though it may not actually be the fact, is true in forty-nine cases out fifty. In this state of the disease, a large number of experiments have been made in

St. Thomas's Hospital, to determine the most beneficial modes of treatment, and the following are the results of my experience.

In a very large majority of cases diarrhoea is the only, or the principal symptom, when the alimentary canal is inflamed. The number of stools varies from three or four to eight or ten, or even to twenty, in the twenty-four hours. They are always loose, and may be indifferently green or yellow, ochre-coloured or black, and frequently contain large flakes of mucus, tinged with bile, and resembling moss-like vegetations. These stools do not furnish us with any accurate data, either as to the nature, the gravity, or the particular seat of the inflammation; for no difference has been observed in them, whether the inflammation be diffuse or follicular, or whether its seat be the colon, the cæcum, the small intestines, or the stomach. It will be evident, in such a state of things, that the exhibition of a series of doses of purgative medicines can only tend to keep up an irritation, which must greatly tend to aggravate the existing inflammation; so much so, that out of ten patients treated by purgatives by Andral,* nine died. It is also certain, that even so mild a remedy as the hydrargyrum c. cretâ has little power over the diarrhoea to assuage it, and perhaps none to change the character of the stools, and to render them more healthy, until the violence of the disease be past. The whole class of astringents seldom proves efficacious; opium affecting the brain, while kino, hœmatoxylum, and catechu, increase rather than soothe the inflammation. Neutral salts, which are not purgative, as the acetate of potash, either in the state of effervescence or otherwise, are grateful to the patient, and by tranquillizing the stomach, always give relief, and are so far beneficial; but in other respects they exercise a very trifling influence over the disease.

Medicines, then, have little effect, either in controlling or subduing the inflammation of the intestinal canal in fever, or even in controlling the diarrhoea. It remained, therefore, to try what effects an almost purely local treatment would

* Clinique Médicale, vol. iii. p. 644.

produce, and whether, by means of soothing the intestine, we might not moderate the inflammation, and in this manner produce, both directly and indirectly, more sanatory effects. Many different plans have been tried to effect this object, but that which has been found the most successful is that of enemata, consisting of barley-water and of syrup of poppies. This plan has been tried during the last seven years in a large number of patients at St. Thomas's Hospital, and with, comparatively speaking, very favourable results. The mode of treatment is as follows.

Immediately on the admission of the patient, whatever may be the stage of the disease, ten grains, or a scruple of rhubarb, are exhibited. The object of this preliminary dose is thoroughly to empty the intestines; for notwithstanding the patient has been suffering greatly from diarrhœa, it has frequently been found, on posthumous examination, that the inflamed portion of the intestinal canal has so strongly contracted on some hard scybala, as to have retained them, and thus, contrary to all expectation, an irritating cause has existed in the intestines, which has mainly contributed to the fatal result. The bowels having been satisfactorily emptied, an enema, consisting of a pint of barley-water, together with half an ounce of syrup of poppies, has been directed to be given night and morning. This simple treatment has been continued till the patient is convalescent, and has been rarely complicated by the exhibition of any medicine whatever. Its success has been remarkable, compared with other modes of treatment, when the fever has been of any moderate degree of intensity; so much so, that in the years immediately before the cholera, out of sixty-three cases treated in this manner, only one died. The cholera was preceded and accompanied and followed by a fever of great severity, and of unusual fatality, and the treatment by enemata in those years has been by no means so successful, only one being saved out of four or five. But still it has been considered, on a comparison of the deaths and recoveries under other modes of treatment, that this by enemata was on the whole the most successful. Many attempts have been made to render this simple mode of treatment more

efficient by the topical application of leeches, or blisters, or mustard-poultices. There is no point, however, more delicate in the treatment of fever, or which requires so much judgment, as the interfering with its course even by apparently so slight a remedy as topical depletion. A man of about thirty years of age was brought into St. Thomas's Hospital, labouring under a severe form of fever, accompanied by slight delirium, and some bronchial inflammation. The treatment by enemata was adopted, and the case carefully watched. As soon, however, as the tongue had began to clean, and the delirium had subsided, it was thought necessary to attempt to relieve the lungs by a topical application of fifteen leeches. They were applied; and on visiting the patient the next morning he was found labouring under such strong cerebral excitement, in consequence of this trifling loss of blood, as to be strapped down in bed. The treatment by enemata was continued, and in two days the delirium subsided, and the patient recovered. The occurrence of delirium after the application of leeches, or else of its aggravation * when it has previously existed, is so frequently witnessed, as distinctly to show, that in fever, as well as in cases of poisoning generally, in proportion as you debilitate the patient, even in the degree perhaps necessary to save a given organ, so is the nervous system generally laid only the more severely under the action of the poison. In all cases, therefore, in which there is a great predisposition to the action of the poison, and it is impossible to distinguish these cases previously to the experiment being made, leeches do harm, and retard the recovery. There are cases, however, in which delirium to a considerable, and even violent degree is kept up, reasoning from results, apparently in consequence of the sympathy existing between the brain and the diseased state of the intestinal

* A woman now lies ill of fever in St. Thomas's Hospital, from whom it was thought necessary to take 12 ounces of blood, in order to moderate the delirium; but instead of the cerebral affection being mitigated it became more violent, so as to disturb the whole ward, and even the sister, who sleeps in an inner room; she also immediately afterwards passed her stools involuntarily. The treatment by enemata was adopted, and she so far improved that her pulse was counted below 100, and there was every prospect of her recovery; but she has been seized with erysipelas, caught from a patient lying on the opposite side of the ward, and she now lies in a very precarious state.

canal. A nurse in St. Thomas's Hospital was seized with fever, during her attendance on a fever patient. The cerebral excitement was in this instance so great, that her screams were heard in the courts of the hospital. It became, therefore, necessary to remove her from the ward into a more private part of the building, in order that she might no longer distress the rest of the patients. It had been attempted to relieve the delirium in this case by leeches, and other topical applications to the head, but without success. Fifteen leeches were now applied to the abdomen, and the system of enemata adopted. They were successful. In a few hours the delirium subsided, and the patient ultimately recovered, though only after a long convalescence, in consequence of extensive sloughing of the back and nates. These cases are not uncommon, and I have sometimes seen delirium in fever amounting even to mania, when examination has shown only extensive ulceration of the cæcum. It is extremely difficult to determine the cases in which these different idiosyncrasies, or susceptibilities to the action of the poison, exist; but if the patient be of a full habit, and young and flushed, and the pulse one hundred and ten to one hundred and twenty in the first stage of fever, the application of leeches has in general been well borne, and given relief. On the contrary, when, as in the cholera years, the patient has been full and bloated, the countenance purple, and the sputa streaked with blood at the first onset of the disease, depletion by leeches from the abdomen, or any other part, has aggravated all the symptoms, and the patient has rapidly sunk.

It is plain, therefore, that in applying leeches to the abdomen, much is at all times put to hazard, and that the ultimate success of the case must, in a great measure, depend on the tact and judgment of the practitioner. It should also be borne in mind, that although the pain of the abdomen is in general referred to the epigastrium, the seat of the disease is, in most instances, the cæcum; and consequently, when the application of leeches is thought necessary, we embrace a much greater number of chances by applying them over the cæcum than over the epigastrium. The most undoubted

symptom warranting the application of leeches to the abdomen, is when pain is produced on making pressure over the cæcum. The state of the tongue ought not to prevent their application when this symptom is present, but they should in all cases be applied with greater reserve and caution when the tongue has changed to brown or black, showing the extreme degree in which the whole system labours under the poison.

Besides the application of leeches, blisters to the abdomen have been occasionally applied as adjuvantia to the treatment by enemata, and with good effect; but mustard poultices are to be preferred to blisters on account of their more speedily acting, of the greater surface they cover, of the heat which they impart, of the greater frequency with which they can be applied, and of their not affecting the bladder. No local application, then, has been found so useful as mustard poultices to the abdomen, and in every severe case they ought to be used once every day, or oftener, till the disease is in some degree controlled, and the patient safe.

As a general principle, therefore, a large experience has shown, that in mitigating the disordered states of the intestinal canal in typhus fever, there is no treatment so generally successful as that by syrup of poppy enemata, together with the application of mustard poultices, and occasional and moderate local bleeding. In adopting this method, we embrace two great chances: 1st, that of relieving the inflamed intestine; and 2dly, that of relieving the brain in all circumstances in which that organ is merely sympathetically affected. The immediate operation of the enemata is to remove from the inflamed part all that irritates it, and thus to place it under circumstances the most favourable to a happy termination. Their indirect effect is to produce a general glow over the whole body, to lull the brain, and to quiet the general as well as the local irritation, and they are of the most service when they are for some time retained.

There are circumstances in which the action of enemata are less beneficial. It is evident that they cannot be of the same service when the stomach or small intestines are the seat of disease, as when the inflammation is seated in the

cæcum or colon. It has also been remarked, that enemata have been more successful when the follicular structure has been the seat of disease, than when the inflammation has been diffuse. It is plain also, when the intestine is so irritable that they are immediately rejected, no opportunity is afforded for producing their usual sanatory effects.

The cases in which enemata are of no service are those in which a considerable degree of meteorism is present, and also when there is hæmorrhage from the bowels. Meteorism is a symptom for which, when it exists in any considerable degree, we have no remedy: it is fatal. Ammonia, æther, wine, stimulating enemata, purgatives, local bleeding, or derivatives, all equally fail with the simple treatment recommended. When considerable hæmorrhage takes place from the bowels, the tepid warmth of the enemata must of necessity be injurious, and they ought consequently to be omitted. Out of four cases of this description treated in St. Thomas's Hospital, two died and two recovered. The treatment of the two that died was half a grain of opium every six hours. The treatment of those that recovered was similar, but they were largely leeched. It is plain that the propriety of applying leeches in these cases must in some degree depend on the quantity of blood already lost; when it has been excessive, as sometimes happens, amounting to many pints, further depletion must render the case hopeless, and we had better rely on the mineral acids, or on the supertartrate of potash, than apply leeches. The application of leeches is intended to remove the cause on which the hæmorrhagic action depends, and by abstracting a little blood, to prevent that enormous loss of it which is sometimes sustained, for a slight irritation, perhaps limited to a point, often involves a large surface of the intestine by contiguous or other sympathy.

When the fever assumes a more complicated form, and the specific action of the poison falls on the membranes of the brain, it is probable this inflammation has its course to run, and for a time will be but little influenced by any remedies that can be employed. The following rules comprise all that we perhaps can effect in controlling the cerebral symptoms.

As long as the delirium is moderate, and unaccompanied by pain of the head, it may be neglected, and hardly one case in twenty, when treated by enemata, will require either leeches or other topical application to the head. It is probable, in this case, that the disease is merely functional. When the pain of the head is, however, severe, and more especially if the conjunctiva be injected, it is necessary to attempt its relief, and for this purpose ten to twenty leeches may be applied to the temples or to the forehead, and may perhaps be repeated; but when the pain is relieved, all the good that leeches can produce has been effected. There is another form of this disease in which the application of leeches is desirable, although no considerable pain be present; namely, in those cases in which the pulse is preternaturally slow, so that it is counted at forty or sixty. This depression arises generally from a considerable congestion of the brain, which it is essentially necessary to relieve, lest a sudden effusion, and consequently a fatal termination, follow.

As adjuvantia to local bleeding, shaving the head and applying blisters, or ice, or cold lotions to it, is often practised. With respect to the operation of blisters,* when the head is affected, Louis tells us that in nearly two-thirds of the cases in which they were applied,† the cerebral functions suffered no appreciable change; of the remaining third, in two only did the delirium cease on the following day; in three it was increased, and in three others the somnolescence and prostration continued their course till they ended fatally; and he concludes, that possessing no power to restore the cerebral functions, adding to the fever and producing many unpleasant contingent effects, they ought to be banished from the treatment of typhus. The effects of blisters in inflammation of serous membranes is any thing but determined. It is admitted they are useful in chronic inflammation, but their

* Dr. Home says: "Blistering seemed to have no good effect in any of the epidemic low fevers, in 1773, 74, or 76, in the Clinical Ward; so that I from that time almost gave over applying them. The advantages that result from them certainly do not counterbalance their disadvantages."—*Clinical Experiments*, p. 30.

† De Gastro Enterite, vol. ii. p. 506.

sanatory effect in acute inflammation of those tissues is extremely doubtful. In fever their action is extremely capricious, and in cases in which they have appeared at one moment to tranquillize the brain, yet if the delirium has again occurred, which it sometimes does, a repetition of the blister has frequently produced an aggravation rather than a mitigation of the disease. Blisters, then, may be had recourse to in fever, but they are not greatly to be relied on, and when applied, should be removed in all cases in twelve hours, to prevent any affection of the bladder.

It has not been common in this country to apply ice * to the head in fever, but Louis applied from one to eight pounds of ice to the heads of twelve patients; ten out of these died, and of the two that recovered, Louis is of opinion that they would have been equally convalescent had the ice not been employed.

Shaving the head and applying evaporating lotions is a practice much used; but though much used, the benefits are not as yet satisfactorily demonstrated, for in mild cases this mode of treatment is unnecessary, and in severe cases inefficient. I have rarely used them for several years past, and I have had no reason to regret this forbearance. When, however, they are had recourse to, great care should be taken to keep the cloths constantly wet, since, when permitted to dry, a reaction of temperature takes place exceedingly distressing to the patient. When the symptoms denote that effusion has taken place, little benefit has been derived from any mode of treatment: leeches, blisters, cold, mercury, all fail in producing absorption, and the patient lies in a hopeless state.

When the fever is still further complicated, and the poison falls on the bronchial membrane, or substance of the lungs, this inflammation has a course to run, though that course is usually short, the poison having nearly exhausted itself. It ought, however, to be a caution to us to be reserved in the use of the lancet. In cases where the inflammation is confined

* Dr. Baillie says: "Cloths dipped in iced-water, and kept almost constantly applied to the shaved scalp, have appeared to me more effectual in removing the delirium than any other remedy."—*Posthumous Works*, p. 238.

to the bronchial membrane, the disease may in general be neglected; or when it is severe, and accompanied by sanguineous expectoration, a few leeches to the chest, or a blister, are usually all that is necessary to arrest its progress. If, however, pneumonia should occur, and auscultation assure us of its invasion, the remedy must be proportioned to the powers of the patient; blood must be taken, though in a less degree than in simple phlegmasia, either by cupping, or from the arm. Eight ounces of blood are generally sufficient to control, in a great degree, the violence of this inflammation; and if we have been in any degree successful in effecting a mitigation, we should wait, knowing the tendency of the poison rapidly to exhaust itself. If otherwise, the bleeding should be repeated; but the case should be well weighed, as the patient's strength must be already greatly exhausted by the long continuance of a severe disease. To bleeding, mercury is a useful adjuvant; and if the state of the patient will admit of it, two grains of calomel should be given twice or thrice a day, together with the same quantity of the pulvis ipecacuanha; blisters also may be employed; and it is a good practice, when the case is severe, to dress the blistered part with a common linseed poultice.

Inflammation of the lungs seldom occurs till the third week of the fever, and not till the patient is becoming convalescent from the other accidents of the poison. In the cholera years, however, the affection of the lungs was among the earliest symptoms of the disease, and was evidenced by the bloated purple countenance, and the expectoration of a considerable quantity of blood. In this form of the disease bleeding or depletion of any kind appeared decidedly injurious, and was followed by a sudden sinking, and the most disastrous results. Some few of these cases recovered under the treatment by enemata; but the more successful mode was, in despite of the symptoms, a tonic treatment from the commencement of the disease. A few cases, which it was difficult to distinguish from pneumonia, were treated from the very beginning by five grains of salicine every six or every four hours, and they recovered. Salicine does not appear to possess any beneficial

property in ordinary cases of fever; but in the cases alluded to it showed very marked powers. It is a tonic bitter, and is perhaps the most pleasant and easily digested of its class—and possesses, moreover, many singular and valuable properties.

Such is the mode of treatment a long experience has taught me to prefer to those proposed by the old masters. The exhibition of enemata as an occasional remedy is spoken of by many writers, and many physicians have attempted to avail themselves of the specific effects of bark thus introduced; but no author has made mention of any systematic use of them, founded on the conviction that the inflammation they had to deal with was long and intractable, and required a patient and persevering use in what may appear perhaps a negative mode of treatment. Success is the only criterion in medicine, and certainly this has effected the cure of a much larger proportion of cases than any other mode I have witnessed. In fevers of any moderate degree of intensity it mitigates all the symptoms, sometimes entirely prevents, but more frequently shortens the brown tongue stage. Indeed, when this treatment fails it is difficult to say what will succeed. It has been seen how little power we possess in controlling the cerebral symptoms; and when the great degree in which the patient has been labouring under the action of the poison, has sometimes induced me to change the practice by enemata for wine,* or æther, or opium, or quinine, or for remedies of an opposite character, the threatening symptoms have either not been influenced by the change, or else have been aggravated, and the catastrophe has in almost every case been fatal. The simplicity also of the treatment by enemata, even supposing it not to be attended with more favourable results than any other mode, is a great recommendation, for it puts an end to the necessity of the practitioner following up symptom after symptom, all of them up to a certain period generally combated unsuccessfully, and thus prevents his being kept in

* Of the four last cases of fever treated by me in St. Thomas's, three recovered by the use of enemata; while the fourth, a man so absolutely deaf that it was impossible to communicate with him except by signs, refused to submit to them, and was consequently allowed four ounces of wine daily; but he died.

a constant state of anxiety, and the patient in a state of perpetual annoyance. It is a mode of treatment that is applicable to every form of the disease, and should be adopted in every case, only omitting the syrup of poppies when the bowels become constipated. The enemata ought also to precede all local treatment of the head, for they often entirely relieve it; so that it is not right to make use of topical depletion, or other local application to that part, till after their exhibition, for otherwise we hazard the aggravation of every symptom, and often make that disease which was before functional now structural. A short statement of former modes of treatment, and their results, will perhaps place that by enemata in a still more favourable light.

As long as fever was supposed to consist merely in an increase of temperature, antimony, ipecacuanha, and the whole class of diaphoretics, were much praised; but since it has been proved that fever is almost always accompanied by profound alterations of structure, these remedies have been abandoned as inefficient, and more especially as it has been found that the most profuse perspirations do not alleviate any of the more leading symptoms of the disease.* Another class of pathologists, who saw nothing in typhus fever but debility, thought it necessary to support the patient from the first moment of the attack with wine, bark, æther, or the mineral acids, and it was not unusual to see, as a result of this treatment, the delirium set in early and violently, the eye to be greatly injected, and the disease to terminate rapidly and fatally. Andral states,† that out of forty patients whom he treated by bark, wine, camphor, musk, asafoetida, the acetate of ammonia, and different distilled aromatic waters, in twenty-six the disease was aggravated, and terminated fatally. Another mode of treatment by the old masters was to combine the two modes of treatment just described, and to exhibit antimony and diaphoretics in the first stage of fever, or as long as

* Clinique Médicale, vol. iii. p. 653.

† The little beneficial influence which those remedies have over fever has been shown by Dr. Home, for in thirteen cases of typhus which he treated by tartar-emetic two only were cured, one was relieved, and ten received no benefit.—*Clinical Experiments*, p. 48.

the tongue was white; on the tongue, however, becoming brown, the stage of debility was supposed to have commenced, and they immediately prescribed from half a pint to a bottle of wine in the twenty-four hours, together with camphor mixture and æther every four hours. This treatment was infinitely more successful than either of the former, and, according to my observation, about four out of five recovered, a proportion certainly small compared with the success that has followed the treatment by enemata.*

The sequelæ of fever, when they do occur, are usually sloughing sores of the nates or other parts, and erysipelas, and the recovery of the patient in either case depends on as liberal a supply of wine, and of other nutriment, as the state of the intestinal canal will bear. Under these circumstances, the previous treatment by enemata has appeared to remarkable advantage over all others; for when those accidents occur under the ordinary modes of treatment, the tongue is generally still brown, the appetite capricious, or if the patient take food it does not nourish him, and after death the bowels are found extensively ulcerated; but after the treatment by enemata, if these accidents occur the patient is much forwarder, his tongue usually white, his appetite considerable, and he generally recovers; so that whatever be the contingency, the treatment by enemata appears to diminish the disease, to increase the chances of life, and not to be attended with any unpleasant consequences whatever.

* It has certainly often resulted, according to the observations of many physicians, that in proportion as the treatment of fever has been mild, so have the number of recoveries been greater. Dr. Home says, (p. 48), in eleven cases where James's powder was given, ten were cured and one died. On comparing, therefore, he adds, the two medicines, James's powder appears to be a much more valuable remedy in typhus than the emetic tartar. Now it happens that James's powder in the present day is considered as an inert substance in medicine, except when a small portion of emetic tartar remains adherent to it after washing. Chomel also, (*Leçons de Clinique Médicale*, p. 520), states, while at La Charité one out of three died under the ordinary modes of treatment, he lost only one in six by adopting a treatment by the chloride of soda, the quantity exhibited in the course of the day being from eighteen to twenty-seven grains, (p. 513), a substance less potent than common salt, so that the recoveries were not owing to the power of the medicine, a mortifying reflection; but the first step in the improvement of medicine must be a just appreciation of the value of the remedies we employ.

Dietetic Treatment.—The diet of the patient from the very first attack of the disease should be strictly limited to slops, barley water, toast and water, ripe fruits, as oranges or grapes, and at most to bread and milk, or bread and butter. This diet is amply sufficient; and generally from his loss of appetite, and impaired powers of digestion, all that he desires. It should be persevered in without variation till the end of the second stage, when the appetite generally improves, and now sago, arrow-root, light broths, rice, or some very plain pudding, may be allowed. No kind of meat, or article of poultry, or fish should be allowed until the patient's tongue is clean, and his pulse quiet, and he is decidedly in a state of convalescence; not that he does not frequently desire animal food long before this period; but when the generally diseased state of the intestinal canal, and also of the mesenteric glands, be remembered, and the length of time that must elapse before those parts can recover their healthy functions, the necessity of caution on this point will be most evident. Indeed, there are no circumstances to which the relapses that occur in fever are so often traceable as to too early an indulgence in animal food.* When the circumstances of the patient will admit, it is at all times most prudent to graduate his return to a full diet, first allowing him white fish, then poultry, and afterwards meat.

Besides the dietetic treatment, the general treatment should be attended to. A nurse is absolutely necessary. The fœcal and other matters should be immediately removed, the patient's person kept exceedingly clean; the chamber should be cool, and the air occasionally changed; the bed curtains undrawn, and if it be necessary in order to avoid too much light, the windows should be darkened; no noise or talking should be allowed in the room, and a good nurse best performs her duty by watching, not anticipating the patient's wants, and by doing no more than the comfort of the patient absolutely requires.

* Dr. Southwood Smith says, "I do not expect, by any language at my command, to communicate to others my own conviction of its danger." —*On Fever*, p. 421.

Preventive Treatment.—After taking care of the patient it is necessary to take care of ourselves. The patient's person generates throughout the whole course of the disease a poison which contaminates his body and bed-clothes, and also vitiates the atmosphere of his apartment, and it is important to determine whether we possess any and what means of destroying the infection.

The vapours of burning sulphur, of aromatic vinegar, the fumes of nitre and muriatic acids, have been employed for this purpose. They all, however, are offensive to respiration ; and the chlorides which possess the property of giving off chlorine gas in such quantities as impregnate the atmosphere without producing any unpleasant effect on the lungs, has of late years entirely superseded all other means. They undoubtedly possess the property of destroying smells ; and the question is, whether, in addition, they possess the quality of decomposing febrile miasmata, and consequently of disinfection. The result of many experiments has been to demonstrate that they possess no such quality. When typhus spread at the Hospital Sâlpetrière, all those charged with the clothes and effects of the patients died, as likewise all those who superintended the fumigation of the wards.

The physicians of the London hospitals are generally, I believe, of opinion that chlorine gas has been of no use in preventing the spread of contagion in those establishments. Dr. Roupel, when physician to the Seamen's Hospital ship, says in the treatment of the fever which existed on board that ship, he did not find that chlorine gas prevented the disease from spreading to other patients, and to several of the nurses. During two epidemics which prevailed in Glasgow in 1821, 1822, and 1827, Dr. Cowper came to the conclusion that the chlorides possess no power or efficacy in destroying infection. It seems quite evident from these experiments that the chlorides, although they possess the power of destroying smells, yet possess no power to decompose the contagious miasmata of fever.

Dr. Lind affirms that the simple heat of a close confined fire, or the heat of an oven, is a destroying power that no infection

whatever can resist ; and he gives instances of this means having been used with success in disinfecting ships. Dr. Henry* has made a series of experiments in proof of this position. His first experiment was with vaccine lymph, which he found to be still capable of communicating the disease, after an exposure to a heat of 120 degrees Fahrenheit. He then exposed it to a heat of 140 degrees and upwards, and found that it had lost its property of infection, and was rendered inert. In a second experiment he found that a flannel shirt that had been worn by a patient in a well marked case of typhus, between the eleventh and twelfth day of the disease, after an exposure of an hour and three-quarters to a temperature of 204 degrees of Fahrenheit, did not communicate the disease to a person below whose nostrils it was placed for two hours. Also that a second flannel waistcoat worn on the night of the eleventh and twelfth day, and heated in the same manner, and worn by the same individual, did not communicate the disease ; and that a third worn by the patient on the night between the twelfth and thirteenth days, after being exposed to heat, and kept in an air-tight canister for twenty-six days, was equally incapable of communicating the disease. In another series of experiments, Dr. H. found that eight flannel waistcoats worn for several hours by patients in distinctly marked scarlet fever, and afterwards exposed to a heat varying from 200 to 204 degrees Fahrenheit, and eventually worn for several hours by children not having had the scarlet fever, did not communicate the disease to those children. Dr. Henry is of opinion that the effect of heat is to decompose, not volatilize, the infecting principle of cow-pox, of typhus, and of scarlet fever ; and that the best mode of disinfecting fomites is to expose them to a high temperature.

The chlorides having been shown to be inefficient, as chemical agents, in decomposing the infectious miasmata ; and the application of a high temperature being impossible during the illness of the patient, no other means of safety is left for the attendants on fever cases than CLEANLINESS, SEPARATION, AND

* Philosophical Magazine and Annals, Nov. 1831, and Jan. 1832.

VENTILATION. These salutary precepts have reduced the cases of fever in the British navy from many thousands annually to comparatively nothing, and we no longer hear of ship fever laying up ships of the line, and their services lost to the country for many months at a time. These protective measures should therefore be adopted in every instance, and all that comes away from the patient should be immediately removed and thrown away ; while all that has been in contact with his person should be immediately placed in water. The linen also of the patient should be frequently changed, and it is a necessary precaution to wash our hands after having been employed in any office about the patient's person. Cleanliness, however, is but an imperfect preventive without ventilation. The air, therefore, should be freely admitted into the room two or three times every day ; a process grateful to the feelings of the patient, and essential to a proper dilution of the contagious miasma. But no ventilation can be perfect when in a plurality of cases of fever the patients are crowded together, and separation is almost as essentially necessary to our safety as cleanliness and ventilation. The patient having recovered, it is necessary to disinfect the room ; and in purifying houses and rooms, in which it is difficult to apply a high temperature, Dr. Bateman states that he has repeatedly witnessed the success of scouring, ventilation, and lime-washing, and he also adds of fumigation, (which has been shown to be unnecessary,) in putting a stop to the continued infection of different families, who have ventured to inhabit the same room or house after a fever patient.

The following cases, taken by a young gentleman, a candidate for the medical prize (Mr. Wegg) in the wards of St. Thomas's Hospital generally, are added, for the purpose of showing the different effects of treatment in the same fever of the same year, and also how far less critical is the case, and how far less anxious is the attendance on a patient treated by enemata, than by the more elaborate methods generally adopted. Three of these cases are likewise remarkable, as having apparently been communicated by contagion, while the seventh case is inserted to show how singularly slow the pulse is occasionally

in fever. The death of this latter patient was probably caused by the tuberculated state of the lungs, which often powerfully disposes the brain and its membrane to disease, and it is probable, therefore, that no art could have restored him. The tenth case, treated by Dr. Roots, is an example of a rare form of fever not amenable to the treatment by enemata, and is valuable for the skill and success with which it was combatted.

C A S E S.

Case 1.—Philip Miller, æt. 20, a hawker and pedlar, was admitted into Edward's ward, under the care of Dr. Williams, on December 25th, 1834. He states that, about fourteen days ago, his little brother brought home the disease from some of his companions; and that his two other brothers, his mother, and his father, were attacked in succession. One of his brothers had died, and his father also died in the taking-in-room at St. Thomas's. The patient himself was taken about a week ago with pain in the head, limbs, and bowels. He was very hot thirsty, without appetite, although his bowels were open; he took some castor oil the same day as he was seized.

27. His head feels hot, as does also the whole surface of the body. There are faint petechial patches over the chest and belly. No pain in the head or abdomen, but slight cough, and uneasiness about the chest. Tongue brown in the centre; white at its edges. Bowels open; and to use his own expression, "he goes many times, and does very little." He is very thirsty; pulse quick. Ordered barley-water, with syrup of poppies, as an enema, twice a-day. Mustard poultice to the belly.

29. Bowels open. Has been rather delirious during the night. When spoken to he answers abruptly, and seems ill-tempered and peevish. When I came up to the bed, he immediately put out his tongue, without being desired, as a child would do, evidently wandering.—To continue the injections.

30. States himself as being better. His breathing has been quick throughout the disease. He had last night what he calls "a dry night;" that is, as he told me, he drank but little water, was not thirsty; but the sister says that he drank a large quantity. His bowels are open. Pulse 115.

31. Rather delirious during the night. He is thirsty; tongue dry; pulse small and quick.

Jan. 3. Is much better. Bowels open; tongue getting cleaner; and in a few days he was convalescent.

Case 2.—Robert Willson, æt. 28, a wire-gauze weaver, was admitted into King's ward, under Dr. Williams, on January 15th, 1835. States that, for the last two years, he has been roving about the country searching for employment, sleeping sometimes in a shed, or even in the open air, living in a miserable manner, half starved. He was attacked, ten days since, with pain in the head, sore throat, pain in the back and limbs; thirst. The bowels being a little confined, he took an ounce of Epsom salts. When admitted, the skin was hot, tongue dry and white, but red at its edges; there was pain of the forehead, a little cough, pulse 120, abdomen tender, bowels confined, numerous petechiæ on the skin. He was ordered rhubarb bolus and syrup of poppy injections.

16. Slept very well during the night. The petechiæ are not so bright; he is rather deaf to-day; tongue dry; has vomited; bowels open; belly a little tender.

17. Passed a tolerable night. Bowels not open; has some cough; rhonchus sonorus heard over the chest; pulse the same. The bowels being confined, he was ordered a rhubarb bolus. Blister to the chest.

19. Tongue rather dry; bowels open; pulse 116.

20. Much the same.

23. He has been improving these last three days. Pulse now 110; tongue cleaner, red at its edges.

27. Is fast improving; pulse less frequent; tongue clean. He speedily became convalescent. The poppy injection only was used throughout the disease.

Case 3.—Charles Haines was admitted into Edward's ward on February 26th, 1835, under the care of Dr. Williams. He states that, six days ago, he slept in a room with a person who was labouring under fever. Two days after this he was himself seized with pain in the head and limbs, and vomited, felt very weak, and was scarcely able to go about. He then entered the hospital. Soon after being admitted, he presented the following condition: the skin extremely hot; pain in the head; the tongue loaded, and red at its edges; also a good deal of cough, and he expectorates mucus; and on listening to the chest, there is sonorous and mucous râle. There is slight tenderness on pressing the belly; he often vomits; his bowels are open; and his urine high coloured.

27. Passed a bad night. The cough is rather worse.

28. Passed a very bad night, did not get any sleep. The breathing is quick, the belly tender, he vomits now and then, the tongue is very red at its edges, whilst in the middle it is white; and moist.

March 2. Has passed a better night. His eyes appear sunken, he is very hoarse, there is a good deal of tenderness on pressing the larynx, the bowels are open, the tongue red at its edges and tip, and he spits up a good deal of mucus, which is tinged with blood. Pulse eighty, and irregular about every third or fourth beat. Belly tender.

3. Has been delirious during the night. Still spits up bloody mucus; the pulse is no longer irregular; the bowels remain open. A blister to the chest.

4. Has been delirious during the night. The bowels are open, pulse 115, belly tender, breathing very quick, tongue losing its white coat, but where the coat has peeled off it is very red. Sonorous râle is heard all over the chest.

5. The patient having been delirious, and with difficulty confined to his bed during the last two nights, his head has been shaved, but no local application made to it. Says he feels better. Has passed a good night. The bowels are open, the respiration better, does not expectorate so much.

6. Passed a very good night. Complains, however, a good deal of his cough; says "he feels as if he should be choked."

The respiration is a little sonorous. The tongue is cleaner; bowels open.

11. Remains in the same state.

14. Sweats a good deal towards morning, and does not get much sleep at night. He soon became quite well and left the hospital, or was I believe turned out on account of bad behaviour. Throughout the whole of his disease no other remedy than the poppy injection was used.

Case 4.—Henry Gover, æt. 17, a pencil-maker, was admitted into Edward's ward, March 19th, 1835. States that fourteen days ago he was taken with shivering, pain in the head and limbs, and “felt sore all over.” He says that he has been attended by a medical practitioner, and has taken some medicine. He now has the following symptoms: pulse eighty-eight, full. There is a little tenderness in the right iliac fossa. The tongue is loaded, red in the middle and edges; and the teeth and lips are encrusted. The bowels are open, the urine high coloured. The face is a little flushed, the skin hot. He remained in this state until the 24th, when he passed a good night. The cough is very troublesome, and on listening to the chest sonorous and mucous râles are heard in its anterior part. The tongue is coated and a little brown. Pulse 110. Bowels open.

28. These last few days he has been improving; he does not, however, sleep much in the night. The tongue is cleaner, there is a little mucus on it. He has a dry cough. Pulse ninety-six, tolerably full. Belly not tender, bowels open. Feels a little hungry.

30. Face flushed. Passes better nights. Tongue cleaner and moist. I found him in a profuse sweat. Belly not tender; bowels open, pulse 100.

April 1. Complains of getting little sleep at night, tongue almost clean, bowels open, skin moistened with sweat, pulse eighty-six, eyes bright, slight cough, return of appetite. In a few days he was convalescent. This case was treated throughout with poppy injections.

Case 5.—George Jessey, æt. 18, a drayman to Barclay and Co. About two weeks ago he was taken with shivering, succeeded by heat. He then had pain in his head and limbs. Now, on his admission, March 23d, 1835, he has pain in the head, some cough, and spits mucus tinged with blood. The skin is rather hot, the belly slightly tender, the tongue coated, the pulse is 120, and rather hard; the bowels are open, urine high coloured.

24. Passed a tolerable night. The cough troubles him a good deal, still spits mucus tinged with blood. Bowels open.

25. He has been furiously delirious the whole of the night, and is delirious now, and confined to his bed with straps. He puts out his tongue with trembling, and draws it into his mouth again with difficulty. Its edges are red, the centre white. His bowels have been open three times during the evening and night. The last motion was dark coloured, the second greenish, and the third whitish. Pulse 120.

28. For the last few days he has been very delirious, and confined to his bed with straps. His face is a little flushed, the right pupil appears to be a little more dilated than the left; it contracts, however, at the stimulus of light. The edges of the tongue are still red, the rest is covered with mucus; it is chapped in the middle, and is still tremulous. The bowels are confined. He keeps dosing, but is easily roused, and speedily falls into his sleepy state again. If he be called to he starts up apparently amazed.

30. Delirium has subsided, but is very much inclined to sleep. Tongue cleaner and moist; belly very slightly tender; bowels confined; pulse ninety-eight, fuller.

April 1st. He is better. Eyes bright, cough better. Has had a good night. Tongue cleaning, belly still a little tender, bowels open. Has return of appetite. Pulse ninety.

4. Passed a good night. The voice, which had been but a whisper, is returning. The cough is a little troublesome. The appetite pretty good. Bowels open.

From this time he speedily became convalescent. The only remedies he used during his illness were a dose or two of compound rhubarb powder and the poppy injections.

Case 6.—John Cokely, æt. 34, was admitted into Edward's ward, Nov. 12th, 1834. He was first taken with pain of the head and feeling of coldness nine days previously to being taken ill, which was three weeks ago. His bowels were then regular. He is not aware of having been exposed to contagious influence. He is now in the following condition. The features are shrunk and slightly flushed, there are a few petechial spots over the abdomen, the general surface is warm, the feet cold. The eyes are suffused, the conjunctiva injected, but no pain in the head. Slight cough. Abdomen soft and not tender, urine high coloured. Pulse 108, small and weak. Tongue covered with a brown crust, and slightly red at the tip. Ordered pulv. rhei gr. x. hâc niocte. Decoct. hordei c. syrup. papav. 3 ss. pro injectione, bis die utend.

Nov. 14. Passed a sleepless night. Bowels freely open. Much prostration of strength. Continue the injections.

15. Another restless night. The prostration of strength greater. The pulse small and weak; but the injection or suffusion of the eyes has disappeared. Sonorous respiration over the whole chest. Tongue red at its edges, the rest of it loaded with brown fur. Complains of pain in several parts of the abdomen.

17. Continues much the same. Pulse 104.

18. Passed a good night. Sleeps the greater part of the day. Spits mucus slightly tinged with blood. Bowels continue open.

19. Is not quite so drowsy. The glands in the neck are swelled and tender. No pain in the head. He is perfectly sensible. Teased by a hacking cough, with slight mucous expectoration. No tenderness on pressing the belly. Tongue red at its edges. Bowels open once in the night. Pulse quick.

20. States himself better. Passed a good night. The bowels have not been open either to-day or yesterday. No tenderness of the belly. Cough troublesome. Tongue much cleaner. A little pain in the head.

21. Better. Tongue cleaner. Pulse eighty-four. Bowels open from rhubarb bolus.

22. Says he has had a better night. Bowels not open. Tongue clean at the tip, white posteriorly.

23. Cough less troublesome. Bowels not open since the night before last, although he has taken castor oil.

26. Glands in the neck very much swollen and tender. In other respects he is much better.

Dec. 1. Has been improving ever since the last report. The swelling in the neck has much enlarged, and fluctuation is quite evident. An incision was followed by a quantity of pus. He has used the poppy injection throughout the disease. From this time all the symptoms began to disappear, and the only thing he complained of was the soreness in the neck. He soon became convalescent.

Case 7.—Robert Gardner, æt. 20, admitted into King's ward, Jan. 8, 1835. States that he has been ill for the last week, and was first taken with pain in the head and limbs, with shivering succeeded by heat. When admitted he had pain in the head, back, and limbs. The respiration was hurried and quick, with a little sonorous râle. Pulse ninety-six. Belly a little tender on pressure, and the bowels confined. The urine high coloured. Considerable thirst. Ordered milk diet. Rhubarb bolus to be taken immediately.

11. Belly very tender on pressure; the bowels confined. Ordered cataplas. sinapis epigastrio. Bolus rhei statim. To have the injection of dec. hordei c. syr. papav. bis die.

13. Seems much the same. Tongue loaded with a white fur.

15. Is worse. There is now great stupor, from which he is aroused with difficulty. He complains of a good deal of pain in the head. Tongue loaded and belly tender. Pulse sixty-three.

16. Has been very delirious during the night, having risen from his bed, and attempted to run about the ward. He is restrained with difficulty; and is incessantly talking incoherent, yet when questioned he answers correctly, but wanders immediately afterwards. Pulse sixty-two. In other respects he is much the same.

17. Had a sleepless night. Pulse sixty-four.

18. Is decidedly worse. Has been very delirious during the night. The pupils are dilated, and almost insensible to light. The belly is very tender. He does not pass his urine. A catheter was introduced to draw it off. He was ordered cataplas. sinapis abdom. hydr. subm. gr. v. st. et cras mane.

19. Is comatose. Cannot be brought to put out his tongue, or to take any notice of questions which may be put to him. Teeth and lips covered with sordes. Skin cold. Pulse 132 and feeble. Still does not pass his urine. Ordered potassæ bromat. gr. v. t. d.

20. The catheter was again introduced yesterday. He is now perfectly insensible, skin cold, pulse irregular and almost imperceptible, and he died at half-past eight P. M. Sectio cadaveris — on opening the head some effusion of serum was found under the arachnoid, as well as a considerable quantity in the ventricles. The brain and its membranes were rather vascular. There appeared to be no disease of the chest, except that in one portion of the lungs there were found a number of small tubercles, and these were also found in considerable quantity upon the pleura. The only disease of the alimentary canal was that at the inferior portion of the ileum; where the mucous membrane had become very soft, was easily detached, and was fast approaching a state of ulceration.

Case 8.—William Adams, æt. 27, was admitted into Luke's ward, under Dr. Roots, 27th March, 1835. States that he has undergone great fatigue, having walked from Manchester to London but a few days since, and being exposed to cold and hunger. He was taken about fourteen days ago with a feeling of general coldness, succeeded by heat, pain in the head, back, and limbs. When admitted he had pain in the head, intolerance of light, diarrhoea, flatulent distention of the colon. He has passed several bilious stools. Face flushed, eyes suffused, pain and feeling of weight across the forehead, a good deal of tremor of the hands. Respiration hurried, and slight sonorous râle heard over the chest. No pain on pressing the belly. The skin hot and dry, tongue loaded. Pulse 105.

Head to be shaved. Cold lotion. Six leeches to temples. Mustard poultice to abdomen. Blister to back of neck. Two or three draughts of soda-water in the twenty-four hours. Slops.

30. There is more prostration of strength. He has slept some four or five hours during the night. Still pain in head; can bear light better. His face is much flushed, the conjunctiva injected. Troublesome cough. Feels prior to coughing a clicking in the throat; he speaks but in a whisper. A little tenderness on pressing the belly. Bowels open. Tongue whitish, with a broad red streak down the middle. Urine high coloured. There is a good deal of tremor on muscular exertion. The skin is hot, and covered with minute petechiæ. Pulse 100, small. Empl. sinapis abdomini. Beef-tea, daily.

31. Ordered beef-tea two pints. Quinæ sulphatis gr. i. 4^{tis.} horis ex infuso rosæ. Pulv. Doveri gr. ij ss. 4^{tis.} horis. Empl. canth. pectori.

April 1.—Passed a better night. There is now so great trembling that he can scarcely articulate his words. The conjunctiva is minutely injected. The skin is hot, but there has been slight diaphoresis. The tongue is moist, and a little cleaner. There is no cough. Bowels open; belly still tender, and a little tympanitic. Pulse wavering, indistinct.

3. Better. Pulse 124, full. Sleeps, however, but very little. There is considerable tympanites, and a little pain in the left iliac fossa. Bowels open; biliary motions. Hand still tremulous. Quinæ sulph. gr. ij. Mustard poultice to the belly daily. Vinum iʒ. 6^{tis.} horis ex sago.

5. The symptoms are much the same. Eyes considerably suffused; sleeps much. Pulse 130. Belly full and tender; bowels open. The medicine and wine suspended.

7. Sleeps well in the night. Tongue cleaner, cough better, bowels open, pulse eighty-four. He speaks more distinctly. There is less tremor. The bowels are to be kept open with castor-oil.

12. Is much better. Is taking quinine, and is in fact convalescent.

Case 9.—Ann Davis, æt. 35, was admitted into Mary's ward, January 22, 1835, under Dr. Burton: states that on the 15th she was taken with pain in the head, back and limbs, loss of appetite, and great thirst. There were, when she was taken ill in the ward in which she was night-nurse, patients ill with fever. These patients were Gardner and Willson, in King's ward. She attributes her disease to having attended upon them. When admitted, her skin was hot, features shrunken, and there were pinkish spots about the chest. There was a good deal of pain in the head, great noise in the ears, intolerance of light and sound. She had some cough, breathing rather sonorous, belly slightly tender, tongue clammy and covered with a brown fur, urine high coloured, pulse 120, small, bowels relaxed, restless nights. Ordered to be cupped between the shoulders to fourteen ounces. Hydr. subm. gr. iij. pil. ipecac. c. conio gr. i. 6^{tis}. horis.

23. Passed a bad night. There is more thirst; skin hot and dry; tongue dry; pulse 120, bowels open.

24. Passed a sleepless night; still very thirsty, with a good deal of sickness and cough, pain on pressing the epigastrium, and in the head. Head to be shaved, and cold lotion to be applied. Hirud. 20 epigastrio. hydr. c. cret. gr. v. pil. ipec. co. gr. ij ss. t. d.

26. Skin hot, great thirst, tongue dry and coated with brown fur, bowels open, motions dark. She is a little deaf. Passed a better night. Pulse 140, feeble. Hirud. 16 temporis. Pulv. cret. comp. gr. xv. hâc nocte. Cataplas. sinapis abdomini.

27. During the night she has been delirious. There is considerable tenderness in the epigastrium; mouth a little sore, bowels relaxed. Pulv. cret. comp. gr. xv. pil. ipec. co. gr. x. c. hydr. c. cretâ ij ss. gr. ter die. Hirud. 12 epigastrio.

28. A little better. Still tenderness at the epigastrium. Hirud. 12. Hydr. c. cret. gr. ij ss. pil. ipec. co. gr. ij. ter die. Soda water with syrup of poppies.

30. Better. Tongue dry and furred, red at its edges; pulse 98. Spr. æth. sulphurici 3 ss syr. papav. 3 i mist. camphoræ 3 ij 4^{tis}. horis.

31. Better. Vini rubri $\frac{3}{4}$ i. 6^{ts}. horis. Continue the mixture.

Feb. 2. Sleeps well. Much better. Pulse 98.

Hydr. c. cret gr. v. pulv. rhei gr. ij ss. pulv. ipec. gr.i. hâc nocte. Continue the wine.

8. Sleeps well. Complains of slight pain at the epigastrium. Empl. canth. epigastrio.

From this time she slowly but progressively became better, till she was made an out-patient.

Case 10. — William Porter, æt. 14, pill-box maker, admitted into Luke's ward, under Dr. Roots, on Thursday, Feb. 12, 1835. States that on Tuesday week he was taken ill with severe pains in the head and limbs, to which succeeded rigors followed by heat, which continued through the night. He felt better in the morning, but these symptoms returned every evening. He continued, however, to work till Saturday evening, although with difficulty, always feeling weak and sick. He had frequent delirium, pain in the head and stomach, and had some medicine. His friends attributed his illness to living in a very damp house that they had just gone into. All the family had been ill, and his father, and I think one or two brothers, died of the disease. He had a motion apparently of blood, as he was riding in the cab to the hospital. This was the first motion of the kind which had been observed. His bowels were previously regular. When he was put to bed the nurse found a large quantity of blood in his trowsers. He was very cold, and without pulse at the wrist, when he was put to bed. An hour or two after this he was warmer, having had a bottle of hot water to his feet, the stomach warmer, blankets, &c. Soon after this the skin was hot and dry, and was covered with the small red spots which Louis mentions, particularly on the chest. The countenance was pallid, the lips slightly livid, the eye not suffused, intolerance of light. He was sensible when roused, and then he muttered something. The respiration was hurried and laborious. There was a little sonorous râle. The pulse small and weak, 150. There was great tenderness over the whole abdomen, especially over the epigastric and iliac

regions. The tongue was dry and covered with brown fur, and chapped. The teeth and lips were crusted with sordes. There was great thirst. The urine high coloured, and very offensive.

Ordered sago with syrup. Head to be shaved, and cold lotion to be applied. Mustard poultice to the abdomen. Starch enema with m. xx. of tr. opii in the evening.

13. Slept a good deal during the night. Head still hot. Pupils contracted. He is slightly delirious, groans a good deal, is comatose, but is easily roused. The tongue is moist and loaded. The bowels have been open, and an offensive bloody motion passed. Pulse varies from 130 to 150.

Ordered a blister to the neck. Ol. ricini 3 ij. Rept. catap. sinapis. Acid. nitr. dil. m. xv. ex mucil. acac. 4^{tis}. horis. Beef tea. In the evening the castor oil was repeated.

14. Has had a motion from the castor oil, which was passed involuntarily, but without any blood. He was delirious during the night; is now more comatose, lying on his back, constantly moaning. Pupils contracted. Pulse 140, fuller, but with no more power. Belly tender.

The nitric acid omitted. Sulphate of quinine, from infusion of roses, 1 ounce, pulv. Doveri 4^{tis}. horis.

15. Was rather more delirious last night. Fæces dark coloured, but he has passed no more blood. Pulse 146. In other respects the same. Being very restless at night, liq. opii sed. m. xx.

16. Constant delirium; throwing off the bed clothes. Pulse 140. The opiate caused him to sleep six or seven hours during the night.

17. He was quiet, and slept during the night. Pulse 140. In other respects the same.

Quinine increased to 1½ grain. The opiate to be given night and morning according to its effect.

He had a dark coloured motion, but no blood.

19. I found him this morning asleep. Belly still tender. Pulse 130. Tongue rather cleaner. Has passed a large healthy motion.

20. Much the same as yesterday.

Quin. sulp. gr. ij. ex inf. ros. c. ʒi. 4^{tis}. horis. Wine out of sago, 6^{tis}. horis.

23. The skin is still hot. He is quite sensible. The opiate is now given but once a day. Pulse 111, fuller. Tongue dry and white. Wine every four hours. There is very little tenderness of the belly.

From this time the lad went on improving, and having recovered, left the hospital about three weeks after.

S C A R L A T I N A,

Is a continued febrile disorder, with certain specific inflammations, and more particularly an exanthematous eruption of the cutis, which runs a given course. The whole duration of the disease varies from eight to thirty or more days ; and being terminated, the susceptibility of the constitution is exhausted to all future actions of the poison.



OF THE POISON OF SCARLATINA.

THREE diseases usually termed the exanthemata are supposed to have originated in the middle of the sixth century, and to have been introduced into Europe by the Saracens: namely, the scarlet fever, the measles, and the small-pox. They are remarkable for being the first of the diseases of "secondary formation," whose abrupt appearance has terrified, and whose subsequent devastations have afflicted the world. Each depends on the action of a different specific poison, peculiar in its laws, but agreeing in the circumstance, that on a first attack it exhausts the constitution of all susceptibility to its future actions; a property which, though not peculiar, yet distinguishes these poisons from most others. The Arabians, who first described these diseases, considered them merely as varieties of one and the same species. Many essential differences, however, were soon observed to distinguish the small-pox, but the points of resemblance between the scarlet fever and the measles were so striking and so many, that it was not until mankind had suffered in the most dreadful manner from the great error of confounding them, that their specific characters were remarked, and their separate identity established.

Sydenham is the first author who has attempted to describe the symptoms peculiar to each disease, but his knowledge of scarlet fever was so imperfect that he has only described one form, or the scarlatina sine anginâ, a disease of little moment, and seldom fatal. The severer forms of scarlet fever, therefore, continued long after his day to be confounded with measles, and with the most disastrous results.

No further progress was made in the diagnosis of these diseases even as late as the year 1748, when Dr. Fothergill describes a disease “ which hath of late years appeared in this “ city (London), and in many neighbouring villages, and in “ several other parts of this nation, and which yielding to no “ remedies or applications, led to the apprehension that it “ was the plague, some losing all, and others the greater “ part of their children, after a few days’ indisposition.”* This disease, from the description of the symptoms, must unquestionably have been scarlatina anginosa, and was so considered by Dr. Cotton. This form of scarlet fever, however, so different from that described by Sydenham, induced Dr. Fothergill, rather than involve himself perhaps in a disputed question, to esteem it a new disease, differing, as he affirmed, from scarlatina and from measles, and which, on his authority, obtained the name of Fothergill’s sore throat ; so that a belief in the existence of three diseases or of scarlatina, of measles, and of Fothergill’s sore throat, each differing from the other only in some ill-defined symptoms, prevailed for the next thirty years, or as late as 1779. In that year, however, Dr. Withering first gave a luminous description of the specific differences between scarlatina and measles, but still admitting the Fothergillean sore throat. I “ acknowledge,” he adds, “ it is not an easy task to distinguish “ them, (the scarlet fever and Fothergill’s sore throat) ; they “ are both epidemic, they are both contagious ; the first “ appearances in the throat are nearly the same in both ; a “ great tendency to delirium, and a frequent unsteady pulse, “ are likewise common to both ; and with features so striking, “ (he says,) is it to be wondered that many practitioners con- “ sider them as the same disease ? and perhaps we shall never “ be able to draw the line where the light begins and the “ penumbra ends.”†

The diagnostic between scarlet fever and measles was a great point gained in nosology, and subsequently the profession have silently admitted, and long before it was stated

* Preface to Account of Sore Throat.

† Withering on Scarlet Fever, pp. 51, 52.

by any writer, the identity of the Fothergill sore throat and scarlatina; for Dr. Sims* remarks with surprise that only nineteen deaths are put down to the account of sore throat in the bills of mortality, for the year in which his paper was written. Thus slowly has the diagnosis between scarlatina and measles been established, and the Fothergill sore throat, once supposed to be a distinct disease, been shown to be merely a variety of scarlet fever.

Remote Cause.—The remote cause of the poison of scarlet fever is entirely unknown. It is certain that this agent had once a local origin; but as the disease is now common in every climate, and prevails at all seasons of the year, the poison must exist generally diffused through the atmosphere, and at all times. It varies, however, greatly in intensity, scarlatina being sometimes sporadic, and at others epidemic, and also mild or fatal in different years.

Predisposing Causes.—Scarlet fever has been found to spread more universally, and with a greater fatality, among the poorer than among the wealthier classes of society, and consequently it must be inferred that bad diet, exposure, and the usually admitted train of debilitating causes, greatly predispose to the reception of this poison. This fever, also, is most common in childhood, and the feebleness of this early period of life probably facilitates the actions of the poison.

It is a law of this disease, that once produced, the infected person of the patient generates a poison, which being diffused through the atmosphere, or else combined with fomites, is capable of inducing the disease in a healthy predisposed person; scarlet fever is therefore both contagious and infectious.

Infectious.—The evidence in favour of the infectious nature of scarlet fever is not so absolute and so distinct as the importance of the subject deserves; for this doctrine being hardly disputed by any author, being generally admitted by the profession, and being universally received by the public, no person has thought it of moment to communicate facts in proof of it. The more prominent circumstances, however,

* Memoirs of the Medical Society of London, vol. i. p. 389.

in support of the opinion of its infectious nature, are the constant and formidable spread of scarlet fever in schools, and its frequent communication to healthy, but susceptible branches of families, when children have returned home labouring under the disease ; and cases of this kind are so common that there are few practitioners who have not witnessed them.

Infecting Distance.—The facts which should demonstrate the distance to which the miasmata may extend around the patient's person and communicate the disease, are in a great measure wanting ; for the scarlet fever being most common in childhood, and the susceptibility of the constitution being generally exhausted at that early age, it is seldom seen to spread in the great hospitals, which are the principal and indeed the only schools of medicine. But the infecting distance is generally supposed to be greater than in typhus. Dr. Blackburne has strangely affirmed it to be so inconsiderable, that were a room appropriated in schools for the reception of such children as might be seized with scarlatina, the spread of the disease would in all cases be stopped. Many facts, however, are opposed to this supposition. The London Foundling Hospital presents excellent opportunities of isolating such patients as may be attacked with scarlet fever, but no precaution has been able to control the infection, when the disease has once broken out among the children. At Ackworth School also, although the infirmary was 250 yards from the school, yet the spread of the disease could not be prevented ; neither could its rapid extension be prevented at Heriot's Hospital, notwithstanding precautionary measures were immediately taken to stay its progress.* The spread, therefore, of the miasmata of scarlet fever, if not accurately determined, appears to be extensive, and beyond that of most other diseases.

Contagious.—The contagious nature of scarlet fever has been strictly demonstrated by inoculation. The eruption of scarlet fever is sometimes intermingled with vesicles containing serum. This serum has, by Sir Busick Harwood and other physicians, been used to inoculate healthy children, in the

* Edinburgh Medical and Surgical Journal, vol. xlvi. p. 34.

hope that by this method a milder disease, as in the small-pox, might be produced. Scarlet fever has, in many instances, resulted from this experiment, but the disease has been as formidable as that which occurs spontaneously, and consequently this practice has of late years not been repeated.

Fomites.—Fomites, or substances impregnated with the miasma, are another means by which the disease is propagated, and the communication of scarlet fever in this manner is a doctrine universally received. Dr. Willan is of opinion that fomites impregnated with this poison are so contagious, that a nurse having received on her clothes or pocket handkerchief the vapour from the lungs, the phlegm from the throat, or the discharge from the nostrils of a patient labouring under scarlet fever, would infect any child predisposed to the disease whom she attended or caressed, (p. 387.) He also thinks that the clothes, bedding, and furniture of the sick, are for some weeks capable of infecting those who handle them; and that even the carriage which has conveyed the patient should be avoided. The opinion of Dr. Sims is similar: “that the infection seemed to remain in a house some, but not many weeks after all the family were recovered.”* So also is that of Dr. Murray, who says, that when the epidemic prevailed in Aberdeenshire, “there were several instances of midwives, previously occupied with patients in scarlet fever, carrying the disease to women whom they attended in labour.”† Dr. Cock even apprehends that he has traced the scarlet fever, which appeared in the island of St. Bartholomew in 1829 and 1830, to a direct importation of fomites; for a family suffered from scarlet fever on their passage from America, and on landing communicated the disease to the persons who received them, thus repaying a friendly hospitality with one of the severest visitations; and from these persons it spread partially over the island. At Ackworth School, also, the spread of the disease was chiefly attributed by Dr. Binns to blameable visits, the sending provisions, or other indispensable communications with the infirmary.

* Memoirs of the Medical Society of London, vol. i. p. 438.

† Edinburgh Medical and Surgical Journal, vol. xvii.

Susceptibility exhausted.—Scarlet fever having once ran its course, or the poison having once produced its specific effects, there results this remarkable law, that all future susceptibility of the constitution to the poison is exhausted in that individual. Dr. Willan has so far established this law, that out of 2000 cases he attended, he saw no second attack. Still, however, it has exceptions ; for Dr. Binns is of opinion that he has seen instances of scarlet fever occurring twice, and in one instance thrice, in the same person. Sir Gilbert Blane has also met with an instance of its occurring thrice in a young lady, “ without the least suspicion of ambiguity or possibility of mistake.”*

Co-exists.—The poison of scarlet fever may co-exist with the vaccine disease, with erysipelas, and probably with most other poisons.

Mode of Absorption.—It is well known that children are occasionally born with the eruption of the measles, or small-pox upon them, and from analogy it may be inferred that the same circumstance must occasionally occur in scarlatina, and consequently that the poison infects the blood. The mode of absorption is, therefore, probably by the mucous membranes, and more especially by those of the lungs. The fact also of the disease having been produced by inoculation, proves that the poison is also absorbed by the cutis.

Period of Latency. — The period after absorption that elapses before this poison produces its specific effects, probably varies from a few hours to about ten days. Dr. Binns remembered several cases in which the disease began two days after exposure. Dr. Withering had repeated occasion to observe it on the third and fourth days ; Dr. Hebden and Dr. Frank on the fifth day ; and other writers have mentioned every other day comprised within the tenth day. It is not determined whether the latency of this poison, as in the small-pox, is influenced by the manner of its introduction ; but in one case in which it was introduced by inoculation,

* Med. Chir. Trans. vol. iii. p. 445, and many similar instances are recorded.

Rostan says that seven days elapsed before the appearance of the eruption.*

In so contagious and formidable a disease as scarlet fever, it is important to determine if possible the period of the earliest generation of the poison, and also the period of its ceasing to be generated, or when the patient's person is and is not capable of communicating the disease. On these points, however, as on many others connected with this disease, we do not possess any satisfactory data, but it is believed that the generation of the poison commences with the previous fever, and before the appearance of the eruption; and pathologists also are of opinion that it does not cease to be generated till a considerable period after the disappearance of all the phenomena of the disease. Dr. Willan, for instance, conceives that patients convalescent from scarlet fever, notwithstanding a minute attention to cleanliness and change of apparel, are capable of communicating it, especially to children, for two or three weeks after their apparent recovery; and Dr. Blackmore has also remarked a similar tendency to infect, after the lapse of as long a period as that stated by Dr. Willan.

Pathology.—The time of incubation being completed, the poison of scarlatina primarily acts on the great nervous centres, deranges their functions, and produces fever, which from its preceding the secondary or specific actions of the poison by a period of twenty-four, forty-eight, or seventy-two hours, is usually termed the primary or eruptive fever. This fever does not remit; and at the end of the period that has been mentioned, the secondary actions of the poison are set up, and the scarlet fever is fully formed. The febrile phenomena continue till after the secondary actions have terminated, when they subside, and the disease, in a great majority of cases, is at an end. In a few cases, however, the tertiary actions of the poison supervene, and the fever may or may not accompany them.

The specific actions of the poison are a peculiar inflammation of the skin, extending to the cellular tissue beneath,

* Clinique Médicale, tom. ii. p. 206.

and producing a tumefaction of the body generally, but more especially of the hands, and this in a few cases terminates either in œdema or in mortification; secondly, of inflammation of the mucous membrane of the eyes, nose, mouth, and more especially of the throat, sometimes extending to the epiglottis, the larynx, or the trachea; and thirdly, of inflammation of the membranes, either of the brain, the joints, or of the abdominal or thoracic cavities. The inflammation of the skin is the great characteristic of the disease. It runs a given course, or from six to eight days, and with few exceptions is constantly present. The affection of the throat is also very generally present, and is only wanting in a rare form of the disease, the scarlatina sine anginâ, but its course is indefinite, and varies perhaps from eight to twenty or more days. The occurrence of the tertiary action of the poison is only occasional, and their frequency has not been accurately determined.

The law that fever precedes the specific actions of the poison has so few exceptions that it requires no proof.

The law also that the great specific action of the poison is on the skin, has likewise but few exceptions, and when it falls on this tissue it produces that inflammation which is termed the exanthema, or rash, a morbid condition difficult to describe, on account of the phenomena being evanescent after death. The eruption, however, as seen during life, is of three descriptions, termed by Frank, scarlatina levigata sive plana, scarlatina milliformis sive papulosa, and scarlatina pustulosa sive phlyctænosa sive vesicularis.

The scarlatina levigata, or smooth eruption, is a diffuse inflammation of the skin, in which its surface presents no inequality either to the sight or touch. The scarlatina papulosa, or papular eruption, is when the inflammation is accompanied by an enlargement of the cutaneous papillæ, especially of those of the abdomen and of the fingers, giving the sensation of roughness, as if those parts were covered with granules, or millet seeds, or in more popular phrase, were "goose-skinned." The third form of scarlatina is when the inflammation is accompanied by a number of small

vesicles, variously distributed, and whose number is limited. They may appear with the eruption, or at any time during its course, and are filled with serum, which, being absorbed, the vesicle shrivels up and desquamates ; but in a few cases, especially about the face, it terminates in the formation of a crust.

The first appearance of the eruption is that of innumerable small bright red puncta or maculæ, separated by interstices of healthy skin. These puncta or maculæ, however, quickly become confluent, and in a few hours the redness becomes general, and diffused over the parts attacked. This efflorescence almost entirely covers the face, neck, and upper extremities, but not the trunk; for on the back it runs into large patches, greatly varying in size and figure, and sometimes appearing like a reticulated distribution of vessels artificially injected. The colour, in the first instance, is that of a bright red, like that of a boiled lobster, but as it declines it becomes deeper, and more resembles that of beet-root, and in severe cases it becomes livid, and intermingled with petechiæ. But whatever tint the eruption may assume, it has this peculiarity, that it disappears on pressure, and again returns (from the periphery to the centre) on that pressure being removed. The colour also is always brighter and more vivid on the flexures of the joints, and about the hips and loins, than over the rest of the body.

The termination of the inflammation of the skin is always by resolution, followed by desquamation, which is of a twofold character. A scurf, or small furfur, detaches itself early in the disease from all the joints, while on some later day, as the seventh or eighth, larger furfures or squamæ of the epidermis are detached from the rest of the body. Occasionally these squamæ are so large as to preserve entire the whole epidermis of the palms of the hands and of the soles of the feet, and Frank has even seen them come away with the hair, nails, and even verrucæ attached.*

Whatever be the colour or description of the eruption, it does not attack all parts of the body simultaneously, but

* *Praxeos Medicæ*, vol. ii. p. 206.

appears partially or in a succession of crops, or, on the first day, on the face, neck, and upper extremities; on the following day on the trunk; and lastly, on the third day, it has extended itself over the lower extremities. The duration of each crop is three days, when it disappears, and in the order of attack; or that of the head, neck, and upper extremities, disappears on the fourth day; that of the trunk on the fifth day, and lastly, that of the lower extremities on the sixth or some subsequent day. The course or duration of the cutaneous eruption, from first to last, is six or seven days, when it entirely disappears.

The poison as frequently falls on the mucous membranes of the eyes and nasal fossæ as on the skin, and it excites a similar inflammation; for the eruption of those parts consists at first of a similar distinct, punctuated, or dotted, appearance, which changes in a few hours to one diffuse red. The inflammation of the ocular membrane, however, has this peculiarity, that it does not distress the sight, for the eye bears the light without inconvenience, and in no case is it suffused with coryza, neither is sneezing or any discharge from the nose a consequence of the affection of the nasal membrane. As the eruption attacking these parts generally appears with, so does it in general terminate with, the first crop.

The affection of the mucous membrane of the mouth and fauces is not so constant as that of the skin, but it is of much longer duration, and is a much graver disease. The inflammation of the lingual and buccal mucous membrane may either precede all other symptoms, or it may occur at any period of the fever, and is found to present on the first attack a punctuated appearance, terminating in a diffuse redness, while the papillæ of the tongue, singularly elongated and enlarged, project salient and erect, and of a deep scarlet or morone colour through the thick mucous which covers that organ.

The inflammation of the buccal, nasal, and ocular membranes, perhaps always terminates by resolution, but the affection of the mucous membrane of the fauces usually runs into ulcerative inflammation. This state of ulceration has

many shades or gradations, which admit of being divided into two great and principal forms, characteristic of the two most important varieties of scarlet fever, or of the scarlatina anginosa, and of the scarlatina anginosa maligna of Willan. The first, or sthenic form, is marked by a greatly enlarged, swollen, and hard state of the ulcerated tonsils, which are of a vivid or bright red colour; while the second, or asthenic form, is marked by a much less degree of tumefaction, by a more formidable ulceration, and by a deeper if not a livid redness.

The most prominent symptom which characterises scarlatina anginosa, or the sthenic form of this disease, is a florid redness of the uvula, tonsils, pharynx, and soft palate, and indeed of the whole mouth. This appearance is either immediately, or at some short period, followed by a considerable swelling of the tonsils, soft palate, and uvula, the last hanging pendant and below the base of the tongue. On the second or third day the tonsils, which are often so enlarged as to threaten the occlusion of the glottis, are sometimes covered with small patches of lymph, and sometimes with sloughs formed by a superficial ulceration; the fauces also are clogged with a great quantity of tough, viscid mucus. The ulcers in this form of the disease seldom burrow deeply, and the sloughs separate either about the fifth or sixth day with the fading of the eruption, or they continue till the eighth, or even some later day. They are slow to heal; and the sore-throat, together with the fever, frequently run on for ten days or a fortnight after the eruption has disappeared.

In the scarlatina maligna, or asthenic form, the tonsils are less swollen than in the former case, but the colour of the parts is deeper and of a more intense or livid redness, and they are more gorged or loaded with blood. As in the scarlatina anginosa, they may, in the first instance, be covered with lymph; but the spots so covered ulcerate with wonderful rapidity, and in twenty-four or thirty-six hours become large excavated ulcers, with a dark slough. The inflammation always extends to the back of the pharynx, which is generally so irritable, that, on attempting to swallow fluids, they are rejected through the nose. The inflammation of this part

usually terminates in resolution, sometimes, however, in ulceration, and in a very few cases in pharyngeal abscess. The tongue also, with its elongated papillæ, is inflamed, and generally much swollen, and its base sometimes so tender that a slight touch produces excoriation, while at others it is deeply ulcerated. Apthous ulceration likewise covers the interior of the cheek. The sloughs of the tonsils, in mild cases, separate about the fifth or sixth day of the sore throat, but in severe cases much later, and not till the fifteenth or twentieth day. In the more malignant cases the mucous membrane of the nostrils, as high up as can be seen, appears of a deep or livid red colour, and after a day or two a thin corrosive sanies, or a white matter, flows from it so acrid as to excoriate the lip, or to produce a number of vesicles, containing a thin ichor, which as it flows inflames the angles of the mouth, the cheek, and every part it touches, and sometimes produces mortification. The healing of the ulcers of the throat in this form of the disease is always tedious, and sometimes even exceeds the duration of the fever.

The inflammation of the throat may extend to all the neighbouring parts. All authors speak of pus in a few cases in every epidemic issuing from the ears; and Horn even speaks of having in one case found the tympanum eroded.* It has been thought that laryngitis was a frequent consequence of the extension of the inflammation in scarlatina; but this does not appear to be the case. Bretonneau (p. 252) says, that in twenty years he has never seen death produced in consequence of laryngitis, or of glottitis; and he conceives that in this disease, the inflammation of the fauces has no tendency to propagate itself to the bronchial tubes. Also, out of 55 cases of scarlatina, reported in the Edinburgh Medical and Surgical Journal,† only one case was suspected to have died of laryngitis. This case was examined, and only two not very large ulcers were found in the fauces; and with the exception of a portion of one lung not larger than a shilling, neither the epiglottis, nor any part of the larynx, or the lungs,

* Frank de Praxeos, vol. ii. part i. p. 194.

† Vols. xvii. xxxiii. xxxvii. xxxix. xlvi.

showed any decided mark of inflammation.* Dr. Southwood Smith, however, has given five fatal cases in which the epiglottis was either vascular, or thickened, or quite black, or ulcerated.† In some seasons it would appear that this inflammation extends even much lower; for, says Mr. Hamilton, “ I recollect only one fatal case in which it was not evident, “ both from the appearances after death, and from the symp-“ toms during life, that violent inflammation had extended to“ the epiglottis, glottis, trachea, and lungs, the bronchia and“ trachea being filled with a darkish muco-purulent fluid, and“ occasionally parts of the lungs were either in the first or“ second stage of hepatization.” It is to be regretted that this gentleman has not stated the actual mortality which occurred in his extensive practice.

The inflammation of the cutis, it has been stated, is accompanied with inflammation of the subjacent cellular tissue. This inflammation takes place as soon as the rash appears, but is of little moment except in a few parts, as the hands, which very commonly swell, so that the patient is unable to bend his fingers, and likewise the face and eyelids, and the tumefaction of these parts, is distinguishable from ordinary ædema in being extremely painful. This inflammation usually terminates in the absorption of the serum effused, but in severe cases it has a tendency to terminate in dropsy or in ulceration, or in mortification. Two instances of this tendency to mortification occurred in two children lately admitted into St. Thomas's Hospital. In one the whole of the toes of the right foot had sloughed off, and the integuments of the leg had mortified from the knee to the foot. In the other, mortification of the upper lip had commenced, and continued to spread till nearly one half of the face was eaten away. The former patient recovered, the latter died. This tendency to mortification is common to many parts of the body. Dr. Watson, in his Account of the Fever that prevailed in the London Foundling Hospital, gives one case that died of mortification of the rectum, and also six others that died sphacelated in various parts of the body. In the girls, some had the pudendal

* Mr. Hamilton, vol. xxxix. p. 144. † See Cases, Nos. 26, 55, 56, 57, 83.

region mortified ; two had ulcers of the mouth and cheek, which sphacelated externally ; while one had the gums and jaw bones so corroded, that most of the teeth fell out before she died. The lips and mouth of many also that recovered, (he adds,) were ulcerated, and continued so for a long time.

In other cases the inflammation of the cellular tissue terminates, not in ulceration or in mortification, but in anasarca effusion. This usually takes place between the fifteenth and twenty-third day of the disease, and almost uniformly commences in the face, and afterwards attacks the hands and feet ; but in some few cases the anasarca is universal, the whole cellular tissue filling so rapidly, that the patient dies within thirty-six hours from its first attack, the cavities of the chest and abdomen also frequently filling at the same time. A case of this latter description was lately received into St. Thomas's Hospital. This patient was about thirty years of age, and only just convalescent from scarlet fever. The anasarca was universal, including the head, neck, face, and trunk ; with accompanying effusion into the chest. This dropsy was only of a few hours standing ; but the man was enormously swollen, and died within twelve hours after his admission. This species of dropsy is very generally accompanied by albuminous urine, caused by deranged function of the kidney.

In many instances, either from an extension of the cellular inflammation, or else from a specific action of the poison, the cervical, submaxillary, or the parotid glands, are inflamed. The enlargement of these parts is sometimes apparent at the beginning of the disease ; at others not till the fifth day ; and in others not till after the disappearance of the eruption. This inflammation frequently terminates by resolution ; according, however, to Withering, Hamilton, Murray, &c. they frequently terminate in large and extensive abscesses, forming a tedious sequelæ to this disease. Dr. Smith has also seen enlargement of the inguinal glands, (p. 174.)

The tertiary action of the poison is on the serous membranes of the brain, on the pleura, perhaps on the peritoneum, and also on the synovial membranes of the joints.

When the fever has terminated fatally, and after violent delirium, the arachnoid has been found vascular, with some effusion of serum or of lymph into the sub-arachnoid cavity; the substance of the brain has also been found injected. But these appearances are by no means uniform; for, says Mr. Hamilton, (p. 150), “on the most attentive examination, “with the exception of a slight dryness of its surface, no “morbid appearances (of the membranes of the brain) could “be detected. In all the cases, however, which have terminated in coma, and which I have had an opportunity of examining, this dry appearance has been uniformly present.” The morbid affections of the brain and its membranes in the acute stage of scarlet fever are similar to those of typhus; but the fever having subsided, and the tertiary actions of the poison set up, the appearances are widely different, for hydrocephalus, with great effusion into the sub-arachnoid, or into the ventricles, is often produced. Besides effusion into the arachnoid and ventricular cavities, serous effusion into the cavities of the thorax or abdomen often takes place, and Dr. Tweedie states that he has observed that the pleura and peritoneum were frequently inflamed. (P. 262.)

When the patient has fallen from dropsy after scarlet fever, the kidneys have in general been found healthy, or their pathological states have been unnoticed. Mr. Hamilton,* however, seems to think that even in the primary fever the kidneys have presented an unusual appearance; generally he says they have been more or less marked externally, in some instances of a pinkish appearance, and in one very bad case they were softer than natural, marbled externally, and very dark red internally. When the patient has died of the subsequent dropsy, he conceives that he has seen the kidney, not only in the first stage of Bright's kidney, but also so far advanced in disorganization as to have been of a whitish cream or straw colour. These remarks, however, require confirmation, for albumen is often found in the urine when the structure of the kidney is healthy; and no instance is known of recovery

* Edin. Med. and Surg. Journal, vol. xxxix. p. 153.

from dropsy with Bright's kidney ; but recovery from dropsy after scarlatina is frequent.

The affection of the synovial membrane has been described by Withering, Sennertus, Heberden, Murray, and many writers, and is a very common concomitant of scarlet fever. This inflammation usually terminates by a serous effusion, which is subsequently absorbed. Two cases, however, have died at the London Fever Hospital from this affection, and given the physicians of that establishment an opportunity of examining the cavities of the joints. In one case * the knee joint when opened was found to contain several ounces of serum mixed with pus, the cellular tissue surrounding it being partly inflamed and partly mortified. In a second case,† Dr. Tweedie found pus deposited in the left wrist and in both ankle joints, and there was a deposition of pus exterior to the wrist joint, and also among the metacarpal bones.

Such are the morbid appearances that have been observed as occurring in scarlatina, and with sufficient constancy to be attributed to a specific action of the poison ; but these appearances are only to be found when the disease is of moderate intensity, and the patient survives some days ; for in severe and rapid cases the patient dies, not from any organic lesion, but from the intensity of the poison, no sensible organic alteration of structure being discoverable after death. Bretonneau observes, (p. 252), “ I have recently “ opened six bodies dead from scarlatina, and have found “ that death was not occasioned by any appreciable inflam-“ mation. The danger, (he adds,) therefore, is not proportioned “ to the inflammation of the pharynx, for I have seen it fatal in “ eighteen hours from the first attack, without redness or “ swelling of the tonsils being very apparent.” Dr. Tweedie also states, that in fatal cases the appearances on dissection were not always sufficient to explain the causes of death, which in most instances seemed more the result of a specific agent operating on the brain and mucous membranes. He states also, (p. 202), that in the malignant form of the disease the affection of the throat did not attract notice, there being little

* S. Smith, p. 228. † Encyclopædia of Med., art. Scarlat. p. 652.

if any swelling; but the dark red colour of the membranes, with specks of ulceration, showed its nature. The experience of these physicians is that of the profession at large.

The great debility incident to severe cases, often produces certain sequelæ, which ought not to be attributed to any specific action of the poison, as occasional ulceration of the hips, nates, or sacrum, and which result from long continued pressure, consequent on the unchanged recumbent posture, in which the patient lies during his illness.

Symptoms.—The varieties of scarlet fever arise out of the law, that poisons may exhaust themselves on one or more of the tissues they affect, without involving the whole series, and also on the admitted fact, that they act with greater or less intensity according to the peculiar idiosyncrasy of the patient. The poison of scarlet fever usually acts on two membranes, or on the skin and on the mucous membrane of the fauces, but its actions may be limited to either the one or the other of those membranes. Presuming then that the term scarlatina should be applied to the most usual form of the disease, or to the affections of the two membranes, the classification of the varieties would be thus:

SCARLATINA MITIOR.*

SCARLATINA GRAVIOR.†

SCARLATINA SINE ERUPTIONE. SCARLATINA SINE ANGINA.‡

Scarlet fever, of whatever description, essentially consists of fever and of certain local inflammations; but among the more striking phenomena of this disease, as in typhus fever, is the remarkable and sudden depression of the moral and physical powers of the body, which the poison produces, a depression so great as in some instances to cause the death of the patient in a few hours, or in a very few days, without any violent fever or any very sensible local lesion being discoverable, for the throat is unaffected, and even the cutaneous affection is, in some instances, wanting. In these severe cases there is no febrile reaction, and the patient sinks indifferent to all surrounding circumstances, and like to one labouring under an over-

* The scarlatina anginosa of Willan. † The scarlatina maligna of Willan.

‡ The scarlatina simplex of Willan.

whelming poison.* Brettoneau says, (p. 252), "the danger of " the disease is not proportioned to the intensity of the in- "flammation of the throat, for I have seen it fatal in eighteen " hours after the invasion, and without any redness or swelling " of the tonsils being apparent; and also when the inflammation " of the throat was most intense, this symptom had little " influence on the issue of the disease." Mr. Murray also says, † that in fatal cases " the pain and swelling of the throat was "commonly less than in severe cynanche tonsillaris, and if this " symptom bore any relation to the disease, it was in an inverse " ratio."

In cases of something less severity the struggle is longer, but the result is equally fatal. Dr. Sims says, (p. 410), that "on the fourth or fifth day, in some even sooner, great "dissipentia began to appear; this never rose to delirium, but "appeared like fatuity, their eyes having a silly vacant stare, "and their words having scarcely any meaning;"—"their pulse "being at the same time very quick, unequal, and weak, and "in many not to be perceived; their extremities had lost "their feverish heat, though far from cold, and their whole "skin assumed a very remarkable appearance, which resembled "nothing so much as that of a dead body which has been kept "several days. They had little purging, but every thing "they passed in that way was mostly without their know- "ledge, as was their urinary discharge. A few of them had "their throats loaded with an enormous quantity of viscid "phlegm, which raised a rattling kind of cough, without any "attempt to spit it up, but far the greater number had lost "most of the morbid appearances of the throat. This stage "lasted but a short time, the patients mostly dying in twenty- "four or thirty-six hours after it began."

Sometimes the febrile reaction is so great as to destroy the

* Brettoneau says, that death must be attributed in these cases to a miasmatic poisoning. Mr. Murray says that he saw one patient, whose disease turned out to be scarlet fever, regarding whom the medical attendant entertained and expressed an opinion, that the symptoms were the result of a poison having been swallowed.

† Edin. Med. Surg. Journal, vol. xvii.

patient almost in an equally short time. "In adults," says Withering, (p. 69), "the rapidity of the fever and the delirium is such that they die upon the fourth or fifth day, especially if a purging supervene. Some survive to the eighth or eleventh day: in all these the throat is but little affected." At Bridlington, (says Dr. Sandwith,) the epidemic frequently proved fatal to infants at the breast on the third, and frequently on the second day, and a few died suffocated and apoplectic within thirty-six hours of the attack. Such are the remarkable phenomena resulting from an intense dose of this poison, and which teach us that the patient is infinitely safer when the ordinary local phenomena which characterise the disease are present, than (supposing the powers of life to be subdued) when they are trifling or altogether wanting. It will now be necessary to describe the symptoms which attend the more usual varieties of scarlatina, in which the local affections are present, and in which the febrile phenomena, though more strongly marked, are less dangerous, and less frequently fatal.

Fever always precedes and accompanies the local affections of the skin and throat in every case of scarlatina, and may be suddenly induced; or else the patient may complain for some days of slight indisposition. Its symptoms may be divided into three stages. The first stage occupies the period from the commencement of the disease till the appearance of the eruption; the second stage that from the appearance of the eruption till its subsidence; while the third stage is reckoned from the disappearance of the eruption till the termination of the disease. The duration of the first stage is, consequently, twenty-four, forty-eight, or seventy-two hours; that of the second is from six to eight days; while the third stage may either not exist, or vary from a few hours to two or three weeks, making the whole duration of the fever to vary from eight to thirty or more days. These stages are not, as in typhus, necessarily marked by changes of the tongue; for, except in scarlatina gravior and in the severer forms of scarlatina mitior, it continues coated with a white mucus throughout the whole course of the disease. In those forms, however,

it becomes brown or black in the second, or at the commencement of the third stage.

The symptoms of the primary fever, of whatever variety, are those of the first stage of typhus, as head-ache—pain in the back and loins—loss of appetite, and white tongue; but still there are symptoms which distinguish it from ordinary continued fever, for the pulse, instead of being full and strong, is small, and weak, and rapid, and the heat of the skin more ardent; and these phenomena, having preceded the usual time, become combined with the local affections, and the disease may now vary from a mere febricula to typhus mitior, while in a few cases it assumes the character, and is attended with the more formidable symptoms of typhus gravior. The nature also of the type appears greatly to modify the local phenomena, giving a sthenic or asthenic character with tendency to mortification, to the inflammations specific.

¶ *Scarlatina sine Angina**,—is that form of the disease in which the *specific* action of the poison is limited to producing inflammation of the skin.

The phenomena of this variety of scarlatina are extremely mild, so that the patient is frequently not confined to his bed. The primary fever is often little more than a mere febricula, and is not aggravated on the appearance of the eruption. The eruption appears at the end of the usual period, and the crops follow each other according to their usual order of succession; appearing first on the face, neck, and upper extremities; on the following day on the trunk; and on the third day on the lower extremities, when consequently the whole body is covered with the exanthemata, and the disease has reached its acmé. On the following day the rash begins to decline, and fades from the face, neck, and upper extremities; on the fifth day it disappears from the trunk; and on the sixth or seventh day it is evanescent over the whole body.

The colour of the rash always appears more florid during the night than in the day, and on its declining, desquamation takes place; with the disappearance of the rash, the fever in this variety ceases, and the disease terminates, but it often

* Or Scarlatina Simplex of Willan.

leaves the patient in a state of considerable debility for many days.

*Scarlatina sine Eruptione.**—In this form of the disease the *specific* action of the poison is limited to one tissue, or to the mucous membrane of the mouth and fauces, the cutaneous exanthema being altogether wanting.

There is seldom a year in which scarlatina has been in any degree epidemic, that cases have not occurred in which patients not having previously had the scarlet fever are seized with severe fever and sore throat, unaccompanied by any eruption, and on subsequent exposure to the contagion of scarlatina they have been found insusceptible of the action of that poison; and hence it is fairly inferred that the disease they have passed through must have been a variety of scarlet fever, or scarlatina sine eruptione.

This disease, therefore, consists essentially in fever and sore throat. The fever which precedes and accompanies the angina is generally severe, and usually assumes all the characters of that which accompanies scarlatina mitior, or the scarlatina gravior. The angina also is in no respect different from the faucial affections of those varieties. As the general and local symptoms consequently, with the exception of the eruption, are similar, and as the duration and danger of the disease is the same, it is unnecessary to give a separate detailed account of the symptoms, as they will be found described at length when treating of the scarlatina mitior, and of the scarlatina gravior.

* Of the existence of this variety there can be no doubt. Dr. Sims appears to have been the first to have remarked it; and Frank, and many other writers, have subsequently witnessed it. Frank says he has often seen this form of the disease “quia immo datur nobis aliisque pluries visa febris scarlatina sine omni efflorescentiā.” (Praxeos Medicæ, vol. ii. p. 203.) Heberden says, (p. 17,) that he has seen the eruption so partial that it was limited to the back of the left wrist. Mr. Murray mentions, that during the raging of the scarlet fever at Alford, in Aberdeenshire, twenty cases occurred in which no eruption could be detected. (Edin. Med. and Surg. Journal, vol. xvii. p. 345;) and Mr. Wood, during the epidemic in Edinburgh in 1832-3, (Edin. Med. and Surg. Journal, vol. lxiii. p. 34,) gives no less than sixteen cases in which no eruption was observable; and he adds, I consider these cases to be scarlet fever, because none of the patients became afterwards affected with the fever and eruption, though very freely exposed to the contagion in the sick rooms and convalescent wards.

Scarlatina.—The essential character of this variety is, that the secondary or specific actions of the poison fall on two tissues, or on the skin and on the mucous membranes of the eyes, nose, mouth, and fauces. The tertiary actions of the poison are accidental, and not essential, and consequently may or may not take place, and it is to be regretted that the frequency of their occurrence is not determined. This disease has two marked gradations, which have caused it to be divided into the scarlatina mitior and into the scarlatina gravior.

The Scarlatina Mitior is distinguished from the scarlatina gravior, by the more enlarged, hard, and swollen state of the tonsils, and by the more sthenic character of the fever. The fever which precedes the eruption in scarlatina mitior is generally of the same duration as in the milder species that have been described, or from twenty-four to seventy-two hours. The symptoms, however, are more violent, and continue so throughout the disease; for nausea, or frequent vomiting, great restlessness, head-ache, and delirium, frequently occur as early as the second day. The more particular symptoms also which distinguish this primary fever from ordinary continued fever are extremely marked, and the morbid increase of heat often raises the thermometer to 105° , while the pulse, quick, feeble, and fluttering, shows the extreme languor, depression, and debility, which the poison has induced. The primary fever having lasted the usual period, the specific actions of the poison are set up either simultaneously or consecutively; for the affection of the throat is occasionally deferred till the rash is at its height, or precedes it, or, what is most frequent, commences with it.

The eruption, whatever be the order of occurrence or of precedence, runs the course that has been described in scarlatina sine anginâ; but its colour is generally more intense, its duration often more variable, and its attack more partial.

When the inflammation of the throat is slight, the local symptoms are little more than a sensation of roughness, with some difficulty and pain in deglutition. When, however, it is of greater severity, and the tonsils so enlarged and swollen as

almost to occlude the fauces, the local symptoms are much increased. The act of deglutition is then not merely difficult and painful, but in many cases impossible, and is at all times much impeded by a thick, viscid, adherent mucus, which frequently requires the effort of vomiting to remove. The irritation of the fauces is also propagated to the larynx, and to the neck, and the patient is hoarse or inaudible, and incapable of moving his head from the painful state of the muscles, which the swelling and enlargement of the cervical-submaxillary and parotid glands greatly increases.

The general symptoms are usually proportioned to the severity of the local symptoms, and especially to those of the throat. In ordinary cases the primary fever is of considerable severity, the head-ache often intense, while the delirium sets in early and is strongly marked. On the eruption appearing the fever does not abate, neither is it increased; nor is it in any degree changed on the affection of the throat being confirmed. But it generally proceeds till the sloughs from the throat separate, which in some cases is on the fifth or sixth day, and should the ulcers now heal, the patient rapidly recovers. But more commonly the separation of the sloughs is prolonged beyond that time, even as late as the tenth or fifteenth day; so that the fever, which does not subside till the ulcers begin to heal, is often prolonged for a fortnight, three weeks, or a month, and sometimes even longer, and the patient is not convalescent till the throat has well granulated. The symptoms that have been mentioned would frequently indicate great danger; but the tongue continuing covered with a white mucus, and presenting the peculiar appearance incident to scarlatina of the red elongated papillæ projecting through it, is the sure harbinger of safety. If in this form of the disease the tongue becomes brown or dry it seldom continues so, except for a very short period. The fever having at length subsided, and the throat healed, the patient is often left in a state of considerable debility, which lasts for many days.

The tertiary actions of the poison are not so common in this form of the disease as in scarlatina gravior, but in a few cases about the time of the disappearance of the rash the joints of

the wrists and fingers, or of the knees, or other articulations, become swollen and inflamed, and present all the phenomena of acute rheumatism: this affection keeps up the fever and prolongs the whole duration of the disease for many days beyond the usual period.

It is seldom that either the mucous membrane or the cellular tissue of the lungs is inflamed in scarlatina mitior, and when it is so the symptoms of bronchitis, of laryngitis, or of pneumonia, in no respect differ from those which characterise those affections under ordinary circumstances.

The sequelæ of this affection sometimes give rise to a series of tedious and painful symptoms which greatly retard the recovery of the patient. The enlarged glands, for instance, may suppurate and form extensive abscesses; or the inflammation of the throat may extend to the eustachian tube, and produce otitis, discharge from the ear, or even permanent deafness, or the tongue may ulcerate; all circumstances which tend to keep up the fever and to prolong the convalescence.

*Scarlatina Gravior.**—The specific actions of the poison in this form of the disease are the same as in scarlatina mitior; but the symptoms, both local and general, are more severe, the tertiary affections more frequent, and consequently the disease is more grave, and the danger more formidable.

The more remarkable symptom which distinguishes this form of the disease is the state of the tonsils. In the scarlatina mitior it has been stated that the tonsils are greatly enlarged, of a bright red, and the ulcers comparatively superficial; but in this severe form the tonsil is less swollen, but more gorged with blood, more livid in colour, while the ulcers are foul, deep, and burrowing.

The throat being less swollen than in scarlatina mitior, the absolute difficulty of swallowing is less, but the pain is greater, and the constant rejection of fluids through the nose shows how seriously the pharyngeal membrane, as also the glottis and epiglottis, are involved in the disease. It is difficult in many instances to examine the throat, for the tongue is often so

* Scarlatina Maligna of Willan.

tender that the slightest touch produces excoriation. The secretions from the mouth are more copious than in scarlatina mitior, and generally impregnated with the offensive sordes of the sloughs. The sloughs also are much more slowly detached than in scarlatina mitior, and when at length they are separated, an ulcer follows with a ragged edge, a foul and dirty base, and into which the finger may be thrust. These ulcers are slow to granulate, and only heal after a long, and sometimes fearful struggle; often they spread in every direction, and the parts vesicate and mortify previous to the death of the patient.

If the throat be the principal indication of the severity of the disease, the eruption affords also some peculiarities; the appearance of the cutaneous eruption is often later by some hours, and when it does appear its colour is darker and more livid, its duration more uncertain, and its distribution more capricious than in scarlatina mitior. Willan states, that he has seen it delayed till the third day,* and Heberden,† and Withering,‡ have seen it delayed till the fourth day of the primary fever. The eruption also is less universal, and comes out more partially, or in scattered patches, especially about the back, the neck, the breast, and the joints. In some instances it is so fugitive that it becomes evanescent a few hours after it has appeared, returning perhaps at the end of a week, and then continuing only for two or three days. In one case Willan says it appeared for the third time, or on the seventh day from the second attack, and remained for two days.

The primary fever is usually longer than in scarlatina mitior, and sometimes precedes the eruption by three or four days. Its symptoms are more violent, and the delirium commences earlier, and is more frequently accompanied by stupor, coma, or convulsions. During the primary fever, and perhaps also during the eruptive fever, the tongue is white, but on the decline of the eruption it often changes to brown or black, or else is dry, glossy, and chapped, and then the elongated red papillæ, so remarkable and so salient when the tongue is

* Willan on Cutaneous Diseases, p. 266. † Heberden Commentarii, p. 22.

‡ Withering, pp. 16, 18.

white, disappear. The brown tongue stage is accompanied by all the phenomena of the similar stage of typhus, as low muttering delirium, subsultus tendinum, muscæ volitantes, involuntary motions, affections of the urinary bladder. From this state the patient may recover, but often when all danger seems passed, the inflamed nasal membrane discharges its fatal ichor, and causes ulceration and mortification of the mouth or cheek. In other cases, the sudden sphacelation of the whole or part of a limb terminates the patient's existence.

In the description that has been given there appears some connexion between the gravity of the fever and the severe and fatal character of the local lesions; but in many instances this connexion is wanting, and especially in children. Many cases are brought to the hospitals, in which the primary and eruptive fever have been so trifling, so little marked by any other symptom than great debility, as to have led the parents to neglect all medical advice; and on the decline of the eruption, the tongue being clean and moist, mortification has appeared, and the little patients, though they sometimes recover, yet more generally fall.

The symptoms of pleurisy, of peritonitis, of croup, of affection of the joints, as also the phenomena of mortification, are unhappily but too well impressed on every mind, to render a particular description of them necessary. Of the tertiar actions of the poison the occurrence of dropsy is among the most remarkable, and requires a distinct consideration.

Dropsy is a disease of frequent occurrence after scarlatina, and it usually occurs on the 22d or 23d day from the commencement of the disease.* It is extremely difficult to determine the proportionate number of those who suffer from this action of the poison. In the year 1834, out of one hundred cases at the London Foundling Hospital, three were seized with dropsy. At Heriot's Hospital, in 1832-3, out of

* There is a case on record in which it immediately succeeded the decline of the eruption, and another in which the interval was five weeks.—(Hamilton on Scarlatina, p. 160.) A case is likewise given by Mr. Wood, (p. 46), in which the dropsy supervened on the twentieth day, and was accompanied by a partial return of the rash, and these data perhaps may be taken as the extreme limits of the liability of the patient to the attack.

forty-five cases, nine fell ill of this disease ; while in the same year, in the town of Edinburgh, Mr. Hamilton, who attended nearly two hundred cases, says that a large portion of his patients became dropsical.

The dropsical affection which succeeds to scarlatina is not a consequence of debility, for it as often, or indeed more commonly affects the patient after a mild than after a dangerous fever. "Indeed," says Dr. Wells, "I have never seen it follow those severe cases which are known by the title of putrid sore throat." Some exceptions have been instanced by Plenciz, by Wood, and by Hamilton, to this rule, but by no means sufficient to invalidate it. It results, therefore, that dropsy succeeding to scarlet fever is not an accidental occurrence, but is induced by a tertiary action of the poison ; for it often attacks those who have not been much weakened, or have recovered their strength, while it is wanting in cases where the strength has been much impaired. The dropsy thus produced is usually limited to a disordered function of the cellular or serous membranes, but in a few cases it is preceded by inflammation of the pleura or peritoneum, and in either case langour, peevishness, constipated bowels, sickness and vomiting, generally precede it by several days.

This disease very constantly begins by œdema of the face, and in cases even of considerable danger often attacks no other part. When more general it affects the hands rather than the feet. In a few cases, however, not only the face and the extremities, but the trunk and body generally, become anasarcaous, and effusion also into the abdomen, head, or chest, though not commonly, is still occasionally seen.

On the first appearance of the œdema the urine is scanty, and commonly turbid ; and although the quantity is small the patients have a frequent desire to pass it. In this case a pain is felt on pressing over the bladder. The urine, however, does not remain long scanty, but is secreted copiously, and continues turbid from numerous small fibres floating in it.

The chemical properties of the urine in dropsy after scarlatina are considerably altered. In many cases, as early as

the first or beginning of the second week of the fever, and sometimes later, even when no dropsy succeeds, the urine assumes a pale red, or pinky colour, and resembles the water in which flesh has been washed, so that there can be no doubt of the unusual colour being caused by the presence of particles of red blood; and it has been remarked that those patients who have this symptom are more slow to recover than those in whom it is wanting. But in dropsy after scarlatina, although the red particles of the blood are absent, another constituent portion of the blood appears to be present in the serum; for when the urine is exposed to a heat of 160 degrees albumen is deposited.* The specific gravity of urine containing this morbid principle is also altered, and is lighter than in health, varying from 1.011 to 1.017.

The first appearance of oedema is usually accompanied by an acceleration of the pulse;† and if the disease terminates favourably, the oedema and accelerated pulse, in addition to the state of the urine, are the only very prominent features. But there are many sources of danger in dropsy after scarlatina, for effusion may take place into the ventricles of the brain, or into the cavity of the chest, or else the anasarca may become so universal and so excessive as to present a very formidable disease.

When the ventricles of the brain are the threatened seat of effusion, the progress of the disease is so rapid that the symptoms often greatly differ from those which are seen in the more customary attacks of idiopathic hydrocephalus. The following case is an excellent exemplification of this difference. A girl eight years old,‡ on the morning of the third day of

* "After I had discovered this fact," says Dr. Wells, "I was no longer surprised at what had formerly appeared to me very strange, that a person who was recovering from this disease, scarlet fever, should eat heartily, sleep well, and apparently have no extraordinary evacuation, and yet remain long and excessively feeble."

† Dr. Wells gives one case, which is an exception to this rule, or that of a boy of eight years old, in whom the pulse was counted as low as fifty-eight in a minute.—See *Medical-Chirurgical Transactions*, vol. iii.

‡ Wells's *Medical and Surg. Trans.* vol. iii.

the disease, complained of head-ache, which in the course of the day became exceedingly violent. In the evening she was seized with convulsions, which from the report of her mother continued for nineteen hours with scarcely any intermission; they then ceased, but returned in two hours; in this interval it was discovered that she was blind, and that the pupils were much dilated. The convulsions afterwards returned, and continued thirty-six hours, when the patient was again blind for eight hours after they had once more subsided. The œdema, which was confined to her hands and face, disappeared, while the convulsions were present. This child recovered.

The next source of greatest danger is the occasional effusion of water into the cavity of the chest, or into the substance of the lungs. This form of the disease is commonly preceded by very general anasarca, and the suddenness with which the chest will fill is sometimes quite remarkable. A case of this kind very recently occurred at St. Thomas's Hospital. A man, about thirty years of age, shortly after the subsidence of the eruption, became suddenly œdematosus, and in three or four days he was so swollen and unwieldy that he could with difficulty walk up the ward. On examining him it was found that water was also effused into the chest. He died in the course of the night, and before any medicine could act, and apparently from the chest continuing rapidly to fill. A rare case is given by Mr. Hamilton, in which the hydrothorax was preceded by pleurisy, with a considerable effusion of lymph, a precursory symptom, it is apprehended, extremely infrequent.

Œdema of the whole body is by no means uncommon, and few diseases present more frightful appearances than that of a young child preposterously swollen in every limb, and in every feature. In these cases effusion sometimes takes place into the cavity of the abdomen, but by no means so frequently as into the chest.

Infants and very young persons are almost the only sufferers from dropsy after scarlatina, and the case last mentioned is perhaps the greatest age known at which a person has suffered from the disease. There appears to be a constitutional

tendency to this affection, for it has been observed to occur principally in children of the same family.

Diagnosis.—The only disease with which scarlet fever can be confounded is the measles, but there are many differences both in their general laws and particular symptoms, by which they may be readily distinguished.

The periods of the latency of their poisons are different, that of scarlet fever being from two to ten days, while that of measles is from ten to fourteen days.

The exanthema in scarlatina seldom appears later than the second day of the primary fever, but in measles it is delayed till the fourth day.

Many circumstances connected with the exanthema are also different. In scarlatina the patches are large, and the surface it covers ample; but in measles it consists of small circular dots like flea-bites, and when most confluent the patches or clusters are small. The colour of the rash is also different, being of a vivid red in scarlatina, while in measles it partakes more of a raspberry hue.

The affections of the mucous membranes are also different in the two diseases. In scarlatina the tonsils are almost constantly greatly enlarged and ulcerated, while in measles they are little or not at all affected. In scarlatina the eyes are free from coryza, while in measles coryza is one of the most characteristic symptoms.

The poison of scarlatina has also many secondary actions, producing affections of the joints, dropsy, or mortification, but similar phenomena are never witnessed in measles.

In scarlatina also the fever does not abate on the subsidence of the eruption, but frequently continues many days or weeks afterwards. In measles the fever usually abates with the disappearance of the rash.

The effects of remedies also in the two diseases it will be seen are different.

The eruption of scarlet fever is distinguished from various other exanthematous eruptions, by the former being general, while the latter is extremely partial, and limited to small

portions of the surface of the body, and also by the presence of a more continued fever.

Prognosis.—The mortality from scarlet fever differs so much in different years, and the data on which an estimate should be formed are so extremely imperfect, that it is impossible to determine, with any degree of accuracy, the proportion of deaths to recoveries. Sir Gilbert Blane states that his practice gave a loss of one in four, while in the different public asylums the deaths are frequently not more than two or three per cent. The prognosis, therefore, is only grave when particular symptoms are present.

The prognosis is unfavourable if the delirium commences, as it frequently does in children, and sometimes also in adults, a few hours after the seizure. In these cases the child often dies on the third or fourth day, and the adult on the eighth or tenth.

The tongue becoming brown, or a clean tongue with a rapid fluttering pulse, are unfavourable symptoms.

A sudden fading of the eruption, or its changing to a livid colour, are symptoms of danger.

The danger of scarlatina is also greatly increased during dentition. Pregnancy also adds to the danger, as the woman frequently miscarries. The prognosis is also extremely grave when it attacks women immediately after parturition. The disease as it occurs under those circumstances has been thus described by Malfatti.* “ Scarlatina usually attacked these “ patients immediately after delivery, and caused the greatest “ prostration of strength, and some slight pain in the throat. “ The eruption then appeared either the levigated or the milli-“ form, and of a dark violet colour. The strength of the patient “ now sank rapidly, and to a burning heat succeeded coldness of “ the extremities, and an exceedingly small and frequent pulse. “ To these symptoms were added great anxiety, hemorrhage “ from the nose, and an intolerably foetid state of the lochia.” The disease in this instance appears to have been universally fatal; for the sick, notwithstanding every effort to save them, and “ qualiscunque adhibita fuerat medela,” all died, some with

* Hufeland's Journal, 12 B. 3 st. p. 120.

symptoms of puerperal fever, and some with those of inflammation of the uterus.

The fauces becoming livid under any circumstances, or an acrid discharge from the nostrils, or else the formation of an extensive abscess of the neck, accompanied with severe purging, are all unfavourable symptoms.

The appearance of mortification in any part is commonly, but not universally fatal.

Affection of the joints is a grave, but by no means a fatal symptom.

The danger attending dropsy succeeding to scarlatina varies according to the season, to the part affected, and perhaps to the treatment. When the head or chest is affected the prognosis is always grave, and the chances are few of the patient's recovery. Dr. Cullen, when speaking of this form of dropsy, seems to consider it as of easy cure, but Plenciz and Hamilton state, that it had been more fatal in their practice than the primary disease. Mr. Wood was so fortunate as to save eight out of nine ; but at the London Foundling Hospital in 1834, three were attacked, and they all died.

Treatment.—In scarlatina the fever is intense beyond that of almost any other disease ; the skin is also inflamed, the fauces ulcerated, and suppuration of the joints and considerable inflammation of the other serous membranes occasionally follow. The inflammatory symptoms are therefore most formidable ; and the question naturally arises, is a disease attended by these phenomena to be treated after the manner of the simple phlegmasiæ, by bleeding and other antiphlogistic remedies, or will that operation, the disease having been proved to depend on the agency of a morbid poison, only the more certainly increase the local inflammation, aggravate every symptom, and still further endanger the life of the patient ? The solution of this difficult problem must of course be determined by a reference to results obtained by the best practical authorities, from the different modes of treatment they may have instituted.

The practice of bleeding was adopted, according to Dr. Willan, on the first breaking out of this disease in all countries,

and with the most disastrous results ; for the early histories of scarlet fever depict it as prevailing like a plague rather than as the occasional and slightly epidemic disease now known. The data, however, afforded by the early writers on this disease are too vague and unsatisfactory to enable us to reason with certainty on the results that were then obtained by the practice of bleeding, and it is to the labours of more modern physicians that we must look for facts to determine the point in question.

Morton is perhaps the first writer on scarlatina on whose reports we can rely, and in his hands the practice of bleeding appears to have been most pernicious. This talented physician confounded scarlatina with measles, and recommended bleeding as the rule of treatment, “ *venæsectio celebrari et repeti cum fructu permittant sed etiam nonnunquam postulant et cardo totius curationis in ejus usu vertitur.* ” But when we look for the result of this treatment in his hands, it is summed up in the admission that “ I have seen 300 die weekly, suddenly suffocated in the second stage of the fever, and while labouring under angina or pneumonia.”

The practice of bleeding was continued to a greater or less extent as late as the days of Huxham, who says that he met “ with too many instances of large and rash bleedings in this distemper ;” and it is well known that Huxham abandoned the practice of bleeding, and introduced that by bark in the cure of scarlatina.

We meet with no further accounts of the actual results of the practice of bleeding in scarlet fever till this disease broke out at the London Foundling Hospital, in the year 1763, when Dr. Watson, the then physician to that establishment, fell into the views of Morton, and, considering scarlatina to be merely a variety of measles, bled largely in this distemper. He bled in the first stage of the disease, “ but the patients did not appear to derive the same benefit from it that they did in common measles.” He bled also in the second stage, if the difficulty of breathing continued, but “ it did not relieve the complaints, but rather increased the patient’s debility ;” and he cautions us not to be “ too liberal of bleeding in

putrid diseases, especially if far advanced"—“a caution,” he adds, “never to be too much inculcated on the young practitioner.” The results of the practice of bleeding in the hands of Dr. Watson were, that out of 121 patients so treated he lost nineteen, or nearly one in six.

Among the last writers on scarlet fever who have practised bleeding in that disease is Dr. Southwood Smith, whose ability is unquestionable, and whose facts are entitled to every consideration. Dr. Smith (p. 408) considers “the most important difference between continued fever, without and “with an eruption, is the greater predominance of nervous “affection in the former, and of inflammatory affection in the “latter. Accordingly, in scarlatina there is not only a greater “tendency to inflammation than in ordinary fever, but the “inflammation, which is set up in the febrile circle of organs, “approximates more to the character of pure inflammation. “There is greater vascular action, with less nervous and “sensorial depression; the consequence is, that blood-letting “may be carried to a greater extent, and will be attended “with still more certain and decided efficacy than in ordinary “fever. After a decided impression has been made upon the “vascular excitement by general bleeding, the application of “ten or twelve leeches is of sovereign efficacy.” The results of this treatment in the hands of Dr. Smith we learn from Dr. Tweedie, who states “that the number of cases of scar-“latina admitted into the London Fever Hospital in 1829 “was sixty, and that ten died.” (P. 202.) He adds also, “that instances of pleuritis, peritonitis, and synovial inflam-“mations, were frequently observed;” also, “that the peculiar “acrid secretion from the nostrils, excoriating the ala nasi; “the enlargement of the parotid or sub-maxillary glands; “the viscid secretion from the fauces; producing great irrita-“tion, and when it extended to the larynx, trachea, and “bronchi, cough and laborious breathing; the acrimonious, “and sometimes bloody discharges, from the severe affection “of the intestinal mucous membrane; sufficiently indicated “the malignant character of this disease. It showed the “same malignity,” he adds, “in private practice, and it was

"not uncommon for two, three, or four children of one family to be carried off by this fatal malady." It is singular that the symptoms described by Dr. Watson appear to have been nearly the same with those observed at the London Fever Hospital, that the practice also was the same, and that the loss also should be the same, or one in six, in both instances.

The amount of direct evidence against the practice of bleeding is very great, but the writers allude rather to the general want of success attending this practice than demonstrate it by any positive data. "Bleeding," says Dr. Fothergill, (p. 32) "in this disease has in general been observed to be prejudicial. Some, indeed, admit of it without any sensible inconvenience, but a repetition of it, even when the disease is mild and favourable, seldom fails to aggravate the symptoms, and in some cases appears to have occasioned very dangerous consequences. The heat, restlessness, and delirium, which this evacuation commonly prevents or mitigates in other cases, in this are increased by it, nor does the swelling of the tonsils, fauces, &c. seem to receive the least benefit from it. On the contrary, though the fulness of these parts decreases, yet the sloughs thicken, the external tumour grows larger, and the spitting commonly diminishes." Withering says (p. 73), "if violent head-ache, or if peripneumonic symptoms, pointed out the expediency of blood-letting, it was sometimes done, but still with less advantage than in almost any other situation; and similar symptoms in other patients were much more effectually relieved by vomiting." Dr. Sims also says (p. 426), "I am certain that I have seen many cases become fatal entirely from an abuse of bleeding, so that it was much safer to prohibit it universally than to be at all free in prescribing it: a second bleeding always did mischief." The same remark will hold good as to scarification and the application of leeches. The opinion of Willan ought not to be omitted, as being an authority, to whose candour and good sense every deference is due. He says, "during the years 1785-6-7, and since,* when the

* The work on Cutaneous Diseases was not published till 1808, or twenty years after.

" scarlatina anginosa was epidemical in the metropolis, I never saw a case in which blood-letting appeared to be indicated. Whenever it had been employed, great depression and faintness, &c. were the immediate consequences, the pulse becoming more weak and frequent, and often irregular. Of two adults who had been largely bled, one died before the time of desquamation ; the other lingered in a very precarious state for twenty days, but at length recovered." (P. 351.) And again (p. 367), " If our countrymen have had more success in the treatment of scarlatina than the physicians of the continent, I would ascribe it to the general disuse of bleeding and purgatives during the last thirty or forty years, within which period gangrene and dropsy have been much less frequent than formerly."

The evidence that has been adduced against bleeding, as it is supported by names rather than by figures, may be supposed to be founded on prejudice rather than on fact ; but we possess a most abundant testimony in proof that much happier results have ensued where the patient was not bled, than when he has been submitted to that practice. It is as follows :—

Dr. Sims states (p. 417), that in the year 1786 he treated upwards of 200 patients, and that out of that number he lost but two. This treatment was by gentle laxatives, mineral acids, and occasionally a little wine.

In the year 1804 scarlet fever broke out at Heriot's Hospital, in Edinburgh, when Dr. Hamilton had fifty of the boys placed under his care, and of these three only died, and those of the secondary symptoms, or of dropsy, and so rapid was the watery effusion that it filled the cellular membrane, and inundated every cavity within thirty-six hours from the attack, and the boys died labouring under symptoms denoting ascites, hydro-thorax, and hydrocephalus. In the treatment " I employed purgative medicines fully. The effect was " favourable ; the fæces were hard, generally of a black or " greenish colour, and foetid, and sometimes of the colour " and consistence of clay, and less foetid. In proportion to " the evacuation of these fæces relief was perceptible." *

* Edin. Med. Surg. Journal, vol. xlivi. p. 41.

In the year 1820 scarlatina broke out at Alford, in Aberdeenshire, and out of 160 cases treated by Dr. Murray, only sixteen died, three of them women, immediately after delivery. This appears to have been a severe form of the disease, and was in the latter stages attended with "a swelling of the wrists and hands, and less commonly of the knee joints, and other articulations, attended with much pain, and a feeling of the want of the power of motion." In the treatment bleeding was but rarely practised." (P. 347.) "Purgatives were not omitted, but I was somewhat disappointed in the degree of benefit derived from them. Emetics were frequently employed, but they only gave relief to the throat, obstructed by swelling or mucus, and their effect in this way was generally very great." "Latterly, however, they have been exhibited only in very urgent obstructions of the throat, for in a few cases they left distressing and long continued sickness, and I think I have known them increase the tendency to sensorial derangement." The affections of the head were met by shaving the scalp, blistering the nape of the neck, putting sinapisms to the feet, and warm fomentations to the legs. The affections of the joints were commonly very distressing, but were in general removed by warm fomentations; stimulants were not used till late, and were generally unsuccessful, though he admits there are cases in which they are admissible.

In the year 1832-3 scarlet fever again broke out at Heriot's Hospital, when forty-five of the boys were seized, and placed under the care of Dr. Hamilton and Mr. Wood, and only one of the forty-five died, although nine fell ill of dropsy. The treatment (p. 37) of the disease, in its primary form, was extremely simple. In some of the earlier cases emetics of ipecacuanha were administered at the commencement of the complaint, but in the latter cases purgative medicines were used in preference, and repeated almost daily, till the fever had subsided, when they were continued at intervals, more or less short, till the patient was considered perfectly cured. The purgatives employed were compound powder of jalap, jalap and calomel, supertartrate of potash, inf. sennæ, Epsom

salts, and compound colocynth pills, varied according to circumstances.

In 1834 scarlet fever prevailed also at the London Foundling Hospital, and upwards of 100 of the children were seized with it. Out of this number only three died, and those of the secondary affection, or of dropsy. The treatment in this case was principally by mineral acids, small quantities of wine, jellies, and a nourishing, but antiphlogistic diet.

Such are the results that have been obtained by the practice of bleeding, as well as by abstaining from it, in the cure of scarlet fever ; and if we compare them, the results will stand thus :—

Of 121 treated at the Foundling Hospital in 1786 by bleeding 19 died.

„ 60	London Fever Hospital in 1829 . .	10 „
181		29

Or nearly 1 in 6.

While of 200 treated by mineral acids and wine, &c. 2 died.

— 160	purgatives and emetics	16 „
— 50	ditto	3 „
— 45	ditto	1 „
— 100	mineral acids and wine	3 „
555		25

Or nearly 1 in 22.

It seems therefore proved, that one in six has died after bleeding, while only one in twenty-two has died after a milder, if not a directly opposite mode of treatment; and the conclusion which inevitably follows is, that the chances of recovery are diminished by the practice of bleeding in the ratio of nearly four to one, as compared with the chances supposing the patient not to have been bled.

The unfavourable results of bleeding as a general principle, not only in this country, but on the continent, have led to a very extended and free use of bark in the treatment of scarlet fever, and many practitioners have invested that medicine with the character of a specific antidote to the poison, and of a sovereign remedy for the disease.

The use of bark has been particularly recommended by De Haen, Sauvages, Navier, Plenciz, and other physicians on the continent, and their favourable opinion is confirmed by

many British authors, as Wall, Cameron, Johnston, Huxham, Cullen, Clarke, and Percival. Dr. Wall says, (vol. i. No. 14,) "when I first gave bark I was not so much directed to its use by the ulceration of the throat as by the petechiæ which appeared in the patient, and I was convinced, in a multitude of instances, that it is truly a specific in the case before us."—"An infusion of the bark, acidulated with the elixir of vitriol, may be ranked as the greatest, best, and most sovereign remedy, provided that gentle emetics and cordial diaphoretics have been given before." And this opinion of Dr. Wall is but the expression of the sentiments of all the writers that have been mentioned. The late Dr. Powel also uniformly treated his cases of scarlet fever, in St. Bartholomew's Hospital, with bark, whatever might be the stage or the symptoms of the disease, and on the principle that this medicine was a specific; and although many of his cases were extremely severe, and the cure sometimes tediously long, yet they uniformly recovered. Such is the evidence for the specific powers of bark in scarlet fever.

On the contrary, Dr. Withering declares (p. 85), "that in the epidemic scarlet fever at Birmingham no medicine ever had a fairer or a fuller trial than bark." "The great prostration of strength, the feeble pulse, and sharp heat upon the skin, with here and there a livid spot, were thought to be such undeniable evidences of the putrid tendency of the disease, and of the broken texture of the blood, that the bark was poured down with a most unsparing hand." And again, "In the autumn the increased disease of the throat, the sloughed appearance of the tonsils, conspired to keep up the delusion. It was very generally believed that the bark was the only medicine that could be depended upon, and mankind had not as yet forgotten how many lives had been lost in the first attack of the ulcerated throat before they became acquainted with the bark." He then proceeds to say that the very high degree of inflammation of the tonsils is often kept up by an improper use of bark and cordials, although it is, nevertheless, true, that many patients do recover who take bark.

Many popular writers, as Dr. Sims and Dr. Fothergill, do not appear to have used bark, and perhaps the fair conclusion respecting the value of this medicine is that drawn by Dr. Willan, (p. 375) that the terms specific medicine, or sovereign remedy, are certainly too strong—"for although the bark "may be in many cases useful, it often disappoints our expectations, and when the disease has been improperly managed in the beginning, or when the symptoms are violent, it is wholly inefficacious."

In the preceding investigation many different modes of treatment have been mentioned as having been practised in the cure of scarlet fever; as that by bleeding; by purgatives; by emetics; by wine, acids, bark, and other stimulants; each being considered by their respective advocates as the best mode of treating the disease. It remains, therefore, to attempt to point out the particular forms of disease to which these different modes of treatment are more particularly applicable, and if possible to establish some general rule by which this always greatly complicated, and too often fatal disorder may be best combated.

The scarlatina sine angina* is a mild form of the disease. It is sufficient to confine the patient to the house—to strictly enjoin a milk diet—to regulate his bowels, and above all things to avoid, according to the precept of Sydenham, the nimia diligentia medicorum, for no other medicine is necessary than gentle laxatives to regulate the bowels. The disease thus treated is uniformly mild, and when the rash declines, the fever subsides, and the disease is at an end.

The treatment of the scarlatina sine eruptione is the same as that of the two following varieties, or that of the scarlatina mitior and of the scarlatina gravior.

The scarlatina mitior† is a form of the disease, it has been stated, which differs from scarlatina gravior principally in the circumstance of the greater swelling of the tonsils and uvula, of their being more superficially ulcerated, and indeed from their presenting altogether an inflammation of a more sthenic character.

* Or Scarlatina simplex of Willan.

† Or Scarlatina anginosa of Willan.

It was in this form of the disease, “when the tumefaction of the fauces was such that the patients could not swallow but with the utmost difficulty,” that Dr. Withering found sudorifics, cordials, and alexipharmics, “have but little to do in the cure of scarlatina anginosa,” and that bark poured down with an unsparing hand produced such consequences “as would not justify a continuance of its use.” It was in this form of the disease, when “the most frequent appearance was a great swelling of the tonsils,” that Dr. Sims, who treated so successfully the other forms of the disease by gentle laxatives a draught containing twenty drops of sulphuric acid, together with a little wine—found if this cordial system was persisted in, or increased with a view to keep up a sinking pulse, many vexatious or even dangerous consequences ensued. For “a new fever often more violent than the first was raised—a great swelling and inflammation of the tonsils or parotids, with acute pain, came on, and the scarlet eruption appeared as copiously as before. I always,” he adds, “subtracted somewhat from the wine and cordials, and quickly prohibited them entirely, diminishing at the same time the spirit of vitriol, which seemed now unnecessary, and giving rhubarb in smaller doses, and relying, during the period of amendment, upon gentle nourishing diet and broths as the only medicines, except when some particular symptom seemed to require attention.” (P. 423.) The accidents observed by Sims and Withering, and which led them to doubt of the efficacy of bark in any form of scarlet fever, only occur according to my observation when scarlatina mitior is treated by bark, for although the ultimate result is generally successful, still for a time the fever is often greatly aggravated, the troubles of the throat increased, the convalescence tedious, and consequently this form of the disease appears to admit of a middle course of treatment, or of one less debilitating than by general bleeding, and less powerfully stimulant than by bark or quinine.

The treatment then of scarlatina mitior is first to tranquillize the stomach and to allay its inverted action, when vomiting

exists, either by small doses of the sulphate of magnesia, or by the effervescent draught, medicines which according to the state of the bowels may be exhibited every four or six hours. As soon as this object is effected, and it is ascertained that the tonsils have acquired the particular character which marks this form of the disease, and are enlarged and swollen, the practice is to relieve them by local bleeding, and twelve to fifteen leeches should be applied to the throat and allowed to draw freely. The trifling loss of blood thus sustained does not impair the general strength of the patient, while it greatly reduces the swelling of the tonsils, and prevents their becoming permanently enlarged. Another advantage is also gained by the application of leeches to the throat, namely, that they relieve the head and tranquillize the delirium, for it is a law of diseases depending upon morbid poisons, that by relieving the part specifically acted upon we relieve the brain. A very marked instance of this two-fold relief was lately observed in a young woman of twenty years of age, who laboured under scarlatina mitior, accompanied with severe head-ache and very active delirium. These symptoms were attempted to be relieved by the repeated application of leeches to the temples, but without success. A similar application of leeches was now made to the throat, when not only was the affection of the tonsils relieved, but the delirium immediately subsided. The relief obtained in this case was remarkable, and as a general principle it follows in similar instances. When the disease is severe it is occasionally, but not often, necessary to repeat the leeches.

The tonsils having been relieved, the fever may now be permitted to run its course little influenced by medicine, and the patient only refreshed by the occasional exhibition of the saline draught, so grateful to his parched mouth and feverish state. For if in these cases we stimulate the patient we only bring back the tumefaction of the tonsils; while, on the contrary, if we take more blood, we hazard the producing the more serious accidents incident to scarlatina gravior. The medicines, therefore, that have been mentioned should

be persevered in till the disappearance of the eruption, the healthy granulations of the throat, and the decline of the fever, give a certain evidence of a state of convalescence. At this point, perhaps, some tonic medicine is desirable,* and prepares the patient once more for the fullest enjoyment of health. This is the most successful treatment of the scarlatina mitior.

The scarlatina gravior† is characterised by the less swollen state of the tonsil—by its being more gorged with blood—by its greater lividity of colour, and by the ulcers being deeper and more spreading, and by the slough being fouler than in the former variety. In this disease also a greater tendency exists in different parts to run into mortification. These different circumstances seem to point to the necessity of adopting a more stimulating plan of treatment, and one more calculated to support the powers of the constitution. The danger, indeed, of permitting this disease to run its course without the aid of medicine may be instanced by the following cases:—A child of about four years of age was seized with scarlet fever. The disease was not interfered with, but permitted to run its course without the aid of medicine. On the decline of the eruption, a discharge took place from the nostrils, the lip inflamed became gangrenous, and the child died in consequence. A man was received into St. Thomas's Hospital with the eruption out upon him, and attention was alone paid to the state of his bowels. In a few hours the right lower extremity mortified from the heel to the hip, and it is unnecessary to state that he also died.

A tonic treatment, therefore, appears necessary in this form of scarlatina, and since it has been proved that bark or quinine is not a specific remedy, it is open to us to adopt either a treatment by that medicine, or else by any other mineral or vegetable tonic we may think preferable. When the sulphate of quinine is preferred, the usual dose for an adult

* Rx. Infusi Aurantii $\frac{3}{4}$ iss., c. Ræ Aurantii $\frac{3}{4}$ iss., or from five to ten grains of salicine ter die; or perhaps, what is still more agreeable, the patient may be indulged with three or four ounces of wine daily.

† Scarlatina maligna of Willan.

is five grains every four or every six hours, and as the powers of easy deglutition are greatly impaired, it is best exhibited out of the infusion of roses, in which it is dissolved by aid of the acid contained in that preparation. In children, of course, the dose must be diminished in proportion to their age. This medicine, when it sits lightly on the stomach, is all that is essentially necessary in the cure of this form of the disease, nor should the presence of delirium prevent its exhibition.

Still it frequently happens that quinine is rejected by vomiting, or that in many instances it is impossible to induce children to take so bitter a medicine without using a most distressing degree of violence, and consequently we are often obliged to look for an equivalent; and it has been proved, by frequent experiment, that wine may be substituted for quinine, both in the child and the adult, without diminishing the efficacy of the treatment, or endangering in any degree the result. Indeed wine being much more easily digested than quinine, the substitute is not only more agreeable, but to a certain extent more advantageous. The quantity for an adult is from four to six ounces, and in the child about half that quantity in twenty-four hours. There may indeed be cases in which it may be necessary to increase those quantities, but they are rare. The wine may be either port or sherry, and is best taken with sago, or drank diluted with water, and should be exhibited in small portions at short intervals in the course both of the day and night. The existence of delirium does not contra-indicate the treatment by wine, for most commonly that symptom is merely a derangement of function, and may be disregarded. The wine should be continued till the patient is decidedly convalescent, and even perhaps for some time afterwards. But while pursuing this treatment it is necessary that the patient's bowels should be strictly attended to, and be gently and daily relieved.

There are cases perhaps in which it is difficult to determine, from the state of the throat, whether it be desirable to adopt the treatment by wine, or to apply leeches, or to permit the disease to run its course without interference.

In these doubtful cases it is perhaps better to err on the safe side, and to prescribe wine, since the only inconvenience that can arise will be that the tonsils may become swollen and tense, an occurrence which is easily remedied by withdrawing the wine, and applying a few leeches.

When it has been thought proper to have recourse to other stimulants than wine or quinine, a great variety of other remedies have been employed, as the Contrayerva root, Cannella bark, the infusion of roses, strengthened by five or ten minims of dilute sulphuric acid, and also ammonia. Of these remedies the dilute sulphuric acid is the best, and ammonia is the worst, since it almost uniformly meets with an acid in the stomach which immediately neutralizes it, and this apparently powerful medicine is at once converted into a nauseating neutral salt.

It is apprehended under the varied treatment now recommended, as applicable to the two most formidable varieties of scarlatina, that the secondary affections or actions of the poison will be of rare occurrence. Those which most usually occur are inflammatory affections of the joints, and dropsy.

Although the synovial membranes may be inflamed, and the joints swollen and enlarged, bleeding is perhaps unnecessary, but all stimulants should be immediately withdrawn, and a moderate action kept up on the bowels by means of the sulphate of magnesia in 3*j.* or 3*ss.* doses out of camphor mixture, and should the pain be severe m. xv. of the Ræ Hyoscyami may be added. Mr. Murray, who saw many cases of this disease in Aberdeenshire, thinks so lightly of this affection, that he says it was commonly removed by warm fomentations.*

The more formidable affection in scarlatina is dropsy, and from the great tendency to effusion into the head or chest, an active treatment is necessary. We should have imagined that in dropsy, a symptom in most cases of great debility, and following a disease whose characteristic is great depression, bleeding would have been dangerous and improper, but experience has shown that bleeding is at all times a prudent, if not a

* Edin. Med. Surg. Journal, vol xvii. p. 348.

necessary measure. As soon, therefore, as œdema appears in the face, especially if accompanied by head-ache, some blood should be taken. The rest of the treatment consists in briskly purging the patient; the choice of the purgative must rest with the practitioner, but the supertartrate of potash in 3*j.* doses three times a day is among the most useful; digitalis also is much recommended in this form of the disease, but it does not possess any peculiar virtue. When the danger of inflammation is over, salicine, which is an excellent tonic and diuretic, may be given in five-grain doses three times a day, or else ten grains of the tartrate of iron may be substituted.

Abscesses of the neck, or suppuration from the ears, are to be treated on the ordinary principles of surgery, or by poultices and injections.

Having thus stated the general treatment of scarlatina, it may perhaps be necessary to speak of the value of certain classes of remedies which are often used in this disease, as emetics, purgatives, blisters, and external applications, including cold affusion.

Emetics have often been prescribed upon two grounds, first, that they were "*the remedy of nature,*" assisting her efforts to throw off the cause of the disease, which it was supposed impinged on the mucous membranes, and again that they were the best means of cleansing the fauces, and freeing them from the disgusting and foetid matters which so often offend the patient, and clog those parts. It is plain, however, that emetics, which are never administered till after the disease is formed, can have no power to prevent the absorption of the poison, neither can they remove it from the system after the febrile actions are once set up, and consequently, as they have no power to prevent or stop the course of the disease, they are useless upon the grounds alleged in the first hypothesis. It is admitted that they have the power of cleansing the throat of its foul matter; but the remedy is violent, and the necessity for it not well made out, so that many practitioners who have prescribed it, as Dr. Fothergill and Dr. Binns, have perhaps, with an excess of caution, supported the patient at the same time by moderate stimulants. The former physician

prescribed immediately afterwards “ small draughts of mint tea, mixed with a sixth part of port wine ; ” while the latter gave wine, or the liquor volatilis cornu cervi, either before the emetic or during its operation. A large number of cases have been successfully treated without emetics, and consequently their exhibition is not essentially necessary. It should be remembered, also, that Mr. Murray, a warm advocate for their use, at length only used them “ in very urgent obstructions of the throat ; for in a few cases they left a distressing and long-continued sickness.” (P. 347.)

Every author, from Fothergill to Willan, has condemned the use of drastic purgatives, as greatly depressing the powers of the patient, and thus laying the foundation of a fatal result. It seems, indeed, difficult to assign any sufficient reason for their employment, as they have neither the power to stop the fever, or, in any great degree, to relieve the inflammation of the throat. Dr. Hamilton appears to have used them with more success ; but it should be remembered that twelve cases out of ninety-five fell under this treatment, while of those treated by moderate stimulants at the London Foundling Hospital, only three per cent. died, which, supposing the disease to have been of equal intensity in both instances, is a great increase of mortality. It is not pretended that cold affusion has the power to eradicate the poison of scarlatina from the system, or to stop the course of its action ; but, as a mode of treatment, it is highly spoken of by Dr. Currey* and by Dr. Gregory, when used in the very first days of the disease, and while the skin is dry and the heat great. Dr. Currey, however, cautions us against using it at a later period ; for in two cases, when “ the patients were taken out of bed, with low delirium, their skin cool and moist, but the pulse scarcely perceptible, and, in this state, supported by two attendants, several gallons of perfectly cold water were madly thrown over them, on the supposed authority of his work,” the effects were almost immediately fatal. Of late years cold affusion has been rarely used, but in its stead a partial ablution of the face and hands either with cold or tepid vinegar and

* Medical Reports, vol. ii. p. 76.

water has been substituted,—a practice grateful to the patient, though perhaps it little influences the result of the disease.

Blisters have been much employed as a means of relieving the throat, but their effect is questionable. Dr. Fothergill (p. 50) used them, and he adds, “I think with advantage.” At the London Foundling Hospital, also, they were used by Dr. Hue, and he thinks most decidedly with the greatest advantage. Dr. Withering says (p. 92), “the blistered patients very often die, whilst those not blistered never failed to recover.” Dr. Currey (vol. ii. p. 53) says, “I entirely agree with that excellent physician (Dr. Withering) in the reprobation of blisters to the neck, from which I never, in a single instance, could perceive benefit, and from which I have suspected very detrimental effects.” Dr. Sims* says, “I have used several outward applications to the throat, and can say but little in their favour.” Dr. Heberden (p. 271) says, “omnis alia faucium curatio præter gargarismata ut mihi videtur est repudianda utpote tædii multum, auxilii parum aut nihil allatura.” Willan says (p. 369), “blisters are seldom useful, and sometimes prove injurious.” It has been necessary to extend the evidence on the use of blisters in this disease, on account of the frequency with which they are used. It is doubtful, perhaps, whether they have occasioned either the benefit or the mischief that has been attributed to them, and, as a general principle, they are better omitted, though they may be useful in particular cases.

The evidence in favour of gargles is by no means uniform: they are commended by Fothergill, Withering, and Willan; while Sims (p. 424) affirms, “I cannot say that I found much benefit from any of them.” Gargles, it is plain, cannot be made use of by very young children, while in the adult, or in children of an age to use them, stimulating gargles, in the active state of the disease, give much pain, and aggravate the inflammation; so that the injection of a slightly acidulated water is far more grateful to the patient, as it equally cleanses the throat, removes the sloughs, and renders the breath sweet: the active stage passed, however, a local stimulus is

* Memoirs of the Medical Society of London, vol. i. p. 425.

beneficial, and every practitioner has his favourite prescription. The best gargle, perhaps, is that composed of the infusion of roses, together with such additional quantity of sulphuric acid as may be esteemed necessary, and sweetened with as much sugar as may render it grateful.

All authors are agreed on the ill effects of scarification, whatever may be the state of the throat. Fothergill says (p. 53), "It is true the sloughs have been sometimes scarified, " from an apprehension that matter was lodged underneath them, without any manifest inconvenience; but as there are many instances of fatal mortification having ensued, it seems most prudent to decline the practice."

Dietetic Treatment.—The dietetic treatment and general management of the patient do not differ from those necessary to be observed in typhus. Dr. Sims indulged his patients with meat even during the existence of the fever; but this is a great error, and a milk diet should be strictly enjoined till the convalescence of the patient is far advanced.

Preventive Treatment.—There is no precaution in the sick room that will prevent the spread of the miasmata, and consequently the infection of persons who may be susceptible of the poison; neither can we disinfect fomites except by a long exposure to air, by ablution, or exposure to a dry heat exceeding the boiling temperature. The impossibility of destroying the contagion has led to some speculations on the possibility of arming the constitution of a susceptible person against the effects of the poison. The most remarkable theory for the prevention of scarlatina in the present day is that of Hahnemann, of Leipsic. The hypothesis of Hahnemann is, that diseases are best combated by remedies capable of producing the disease, and to this doctrine he gives the name of homœopathy; and he affirms, if one-eightieth part of a grain of belladonna be given twice a day, that it will preserve a susceptible party from the attack of scarlatina. It is impossible to contend with a doctrine neither supported by ingenuity of hypothesis, by any intelligible argument, nor by any sufficient number of facts; for there is no evidence to show that belladonna possesses the property attributed to it, or the

power of producing scarlet fever, while the cases of exemption after this practice are most questionable. The best commentary perhaps will be to quote a passage from Dr. Sims (p. 440), that "the best preventive of the disease I found to be rhubarb, taken in the quantity of a few grains every morning, so as to produce one laxative motion in the day. I did not see one who used this confined afterwards to bed, though several persons began it after they were infected, but before the time of their sickening." Dr. Sims' authority is quite as veritable as that of Hahnemann, and his charm seems even more valuable, for he endows it with the power of actually neutralizing the poison while yet latent in the system.

M O R B I L L I.

The measles are a continued febrile disorder, with certain local lesions, but more especially a peculiar inflammation of the skin, which runs a given course. The laws of this disease vary in many remarkable circumstances from those of scarlatina, but agree in the poison, exhausting the susceptibility of the constitution to its action on the first attack.

OF THE POISON OF MEASLES.

IT has been stated the measles appeared at the same time in Arabia with the scarlet fever, and from certain resemblances in their precursory symptoms, and in the character and seat of their eruptions, that the Arabian physicians were induced to consider them not merely as diseases of a kindred affinity, but as varieties of the same species, and consequently as originating from the same poison. A deeper study, however, of the laws of scarlatina and of the morbilli has shown many essential differences in the nature, symptoms, and course of these diseases; and also that their phenomena are very differently influenced by the same treatment, so that no error is greater in medicine than confounding and treating these affections on the same principles. It follows, therefore, that scarlatina and measles being opposed both in their general laws and specific phenomena, must originate in the action of separate and independent agents.

Remote Cause.—As the measles appeared in the same country, and at the same time, with scarlet fever, it is to be presumed that their respective poisons must have had a similar local origin. But the measles, like scarlatina, now prevail all over the world,* are present at all seasons, and frequently without our being able to trace them to any contagious source; so that we must infer that the morbillous poison is generally diffused through the atmosphere, and at all times of the year. It seems to be a law of poisons, generally, that they vary greatly either in quantity or intensity; and the measles have been constantly observed to reign epidemically rather than sporadically, breaking out in certain

* Andral affirms that they were introduced into America in 1518.—*Cours de Pathologie Interne*, par M. G. Andral, p. 477.

years at the beginning of winter, increasing till the vernal equinox, and dying away towards the summer solstice.

Predisposing Causes.—The influence of the seasons in the production of measles has been just stated. It is probable that the other causes predisposing to this disease must be similar to those of poisons generally; but the measles, though incident to every period of life, are more frequently contracted in childhood, when it is difficult to trace the effects of accidental circumstances; so that our knowledge of the predisposing causes is imperfect.

It is admitted by all authors that the diseased person of a patient labouring under measles generates a poison, which, either diffused through the atmosphere, or combined with fomites, is capable of producing a similar infection in a pre-disposed person. Measles are therefore both contagious and infectious.

Infectious.—The infectious nature of measles is so universally admitted, that nobody has thought it necessary to support this law by particular instances, and in no part of medicine is there such a deficiency of proof of an undoubted proposition. I have often seen them spread at St. Thomas's Hospital, and particular facts of this description must be in the memory of every practitioner. The general evidence, however, is strong, and quite sufficient to establish the infectious nature of measles, namely, their constant spread in schools and in other infantile establishments, and the general impossibility of protecting susceptible persons when associated with the infected—facts which, supported as they are by the concurrent testimony of the profession, abundantly establish the existence of the law contended for.

Infecting Distances.—On this subject, also, our information is greatly defective, and all that we can at present affirm is, that when the disease breaks out in our public schools that it spreads as widely and as generally as scarlet fever, and consequently there is ground for inferring that the range of the poison must be equally extensive.

Contagious.—The contagious nature of measles has often been proved by direct inoculation, either with blood drawn

from the arm of a measles patient, or else with serum taken from the vesicles which are occasionally intermixed with the eruption. The experiment of inoculating for the measles seems to have been first made by Dr. Home, who, reasoning by analogy from the success attending the practice of inoculating for the small-pox, ventured about the year 1750 to inoculate for the measles. "For this purpose," he says, "I ordered a very superficial incision to be made amongst the thickest of the measles, and the blood which came slowly away was received upon some cotton; an incision was then made in the arm of the patient to be inoculated, as is done in the small-pox. The wounds were allowed to bleed freely for a quarter of an hour, the cotton was then put in, and allowed to remain in the wound for three days. The symptoms produced were running of the eyes, as strong in the inoculated as in the natural measles. I never saw so great a running from the eyes in this distemper as happened in one of the experiments, but the cough almost disappeared in the artificial kind. I attempted," he adds, "to produce the disease by putting a pledget of cotton that had been for some time up the nose of a measles patient, but they all failed."

The contagious nature of the serum contained in the vesicles, which sometimes accompany the eruption of measles, has been proved by Mr. Wachsel. This gentleman inoculated a lad, Richard Brooks, with the fluid taken from those vesicles, and also from the vaccine pock. Both diseases were produced, the vaccine virus taking the precedence, owing perhaps to its having a shorter period of latency than the morbillous poison.

The experiments of Home have been repeated by Vogel, Brown, Monro, and Tissot; and the result has led them to imagine that a mitigated and mild disease followed. On the contrary, however, the similar experiments made by Cullen, Girtanner, Rosenstein, and Vaidy, were not attended by any such mitigation of the symptoms as in their opinions warranted the continuance of the practice, and consequently of late years the inoculating for measles has been discontinued. As

late, however, as 1822, Professor Speranza, in an epidemic that prevailed at Mantua, inoculated himself and six boys, after the manner recommended by Home: they all took the disease, and it ran a mild and regular course.

Fomites.—The following instance is a striking example of the morbillous poison infecting fomites. A boy belonging to the London Foundling Hospital was permitted to visit his friends at a house where a child lay ill of measles. In the evening the boy returned to the Hospital, and mixed with his playfellows as usual, but in the course of fourteen days this lad, together with sixty other boys, were sent to the Infirmary, ill of measles. In this case there seems to have been no other source of contagion than the boy's clothes. The strictest demonstration, however, of this law are the experiments of Home and Speranza, in which the disease was communicated by the direct application of substances infected with the poison.

Susceptibility exhausted.—The morbillous poison having once produced its specific effects, leaves the patient exempted from all liability to a second attack. This law may be considered as proved by Willan (p. 235), and by Rosenstein (c. xiv.)—the former affirming, that after an attention of more than twenty years to eruptive complaints, he had not met with an individual who had twice had the febrile rubeola, while the latter states that during a practice of forty-four years he had met with no instance of a second affection. There are, however, occasional exceptions to this law. Instances are mentioned by Burserius,* and by Roberdieu,† in which the disease occurred a second time in the same subject. Home also says† that it was not uncommon for measles to attack the same person twice, “of which I had two cases;” and he adds, “I have been told that some had them thrice.” The law, therefore, of the susceptibility being exhausted has its exceptions, and there is even one entire variety that does come within the general rule, or the rubeola sine catarrho; for Dr. Willan states, that in two instances in his own family

* Institut. Med. Pract. § cxii. † Recherches sur la Rougeole, p. 3.

‡ Med. Facts and Experiments, p. 255.

the rubeola vulgaris occurred after an attack of rubeola sine catarrho, (p. 207,) and consequently he conceives from those and other instances that the latter disease has no power to protect the constitution against the attacks of the rubeola vulgaris.

Co-exists.—The poison of measles is capable of co-existing with many other poisons. Macbride assures us that it was not uncommon in his day to see measles and small-pox* coexisting together, and that the combination generally proved fatal. Pinel gives the case of a young man† sixteen years of age, that was inoculated for the small-pox, when on the second day he was seized with measles. The measles ran their course, but no sooner had they terminated than the puncture of the arm inflamed, the variolus fever appeared, and the small-pox now ran its course and terminated favourably. Cases of an inverted precedency, or in which the small-pox has preceded the measles, have been given by De Haen, Vogel, and Horne. The co-existence also of cow-pox and measles, and of hooping-cough and measles, are by no means of unfrequent occurrence ; and probably the catalogue of combinations with poisons either in an active or a latent state might be much enlarged.‡

Modes of Absorption.—That the poison of measles is absorbed, and infects the blood, is a fact about which no doubt can be entertained after the experiments of Dr. Home ; but another proof is to be found in Hildanus, who saw a woman, while labouring under the measles, bring forth a female child

* In two cases, Dr. Bateman states, that he and Dr. Willan saw small-pox and measles co-existing. In the one the eruption of measles came out on the fifth day of the eruption of small-pox, and both ran their usual course. In the other the small-pox came out on the third day of the eruption of the measles, which continued visible for two days more. In this case the pustules of the small-pox filled more rapidly, and with a more pellucid fluid than usual, so as to be quite turgid and transparent on the fourth day, but in two days more the fluid in them became quite purulent : both children recovered.—Edin. Med. and Surg. Journal, vol. xv. p. 314.

† Nosographie Philosophique, vol. ii. p. 51.

‡ In one case the hooping-cough, which had continued above six weeks, was suspended by the occurrence of the measles, but returned on the decline of the latter.—Bateman, Diseases of London, p. 91.

covered with the morbillous eruption. This poison is consequently absorbed, and most probably both by the mucous and cutaneous tissues.

Period of Latency.—The period of time which the poison may lie in latent combination with the blood has been determined by many authorities to vary from ten to sixteen days. Heberden* saw four men that were affected with the disease on the tenth day after exposure to the infection, also, one on the thirteenth, and two on the fourteenth day; and similar intervals have often been observed by Dr. Hue, at the London Foundling Hospital. This disease has been so seldom produced by inoculation that it is not ascertained whether the period of latency varies when the poison is introduced by the skin, but Home observed in his experiments that the eruption appeared on the sixth day after inoculation.

Various conjectures have been entertained respecting the period at which the contagion of measles is first generated. Many believe the poison is not secreted till after the appearance of the eruption, while others believe it takes place during the primary fever. The following cases seem to establish the latter hypothesis. A merchant set out from London to Pyrmont on the 30th of June, 1825, taking with him his wife and three children, but leaving behind a fourth child, apparently attacked with severe catarrh, and which afterwards proved to be the measles. The party arrived at Pyrmont on the 8th of July, and on the day following, one of the children at Pyrmont, the playfellow of the one left behind, was taken ill of what appeared to be a common catarrh, but as the account of the child in London having the measles had not yet been received, he was permitted to associate with the rest of the family till the 11th of July. On that day, however, the two remaining children were removed to a different apartment in the same house, while three little girls, the daughters of the host, were removed to a different part of the town altogether. On the 12th of July the eruption broke out in the child affected with catarrh, and on the 24th and 25th the five children, who

* Commentarii, p. 271.

had not seen the infected child since the 11th of July, or the day before the eruption, fell ill of the disease. These instances are extremely remarkable, for there was not a case of measles at Pyrmont at the time, and from the little patients being strictly secluded, the disease did not spread to any other family in the town.* The infection, therefore, must have been communicated during the primary fever, and before the appearance of the eruption.

Pathology.—The period of incubation passed, the poison gives rise to a continued fever, which does not remit on the appearance of the eruption, but continues throughout the whole disease; at the end, however, of three, more generally four, and, in some few instances, five days, certain secondary or specific phenomena, as inflammation of the skin, and of the mucous membranes, but more especially of those of the eyes, nose, mouth, fauces, and bronchia, are set up. In a few cases, likewise, the poison produces certain tertiary affections, or inflammation of the substance of the lungs, or of the pleura. As the primary fever lasts from three to five days, and the eruption from six to seven days, it follows that the whole duration of the disease is from nine to twelve days. When, however, the tertiary actions occur, the disease is often much prolonged.

The law that fever precedes the specific actions of the poison, has scarcely a recorded exception, and, consequently, though the pyrexia may greatly vary in intensity, it is almost uniformly present. The fever preceding the local lesions is termed the primary fever.

The second great law of measles, or that the secondary action of the poison is on two membranes, or on the skin and mucous membranes, has some exceptions; for the affection of the mucous membranes appears to be entirely wanting in one variety, or in the *morbilli sine catarrho*. Examples of the law also that the poison produces certain tertiary actions, as inflammation of the lungs or pleura, are so common that it requires no proof, but we must regret that their proportional frequency is not ascertained.

* Rust's Magazine, February, 1827.

Since the affection of the skin is uniformly present, while that of the mucous membranes is sometimes absent, the eruption is necessarily the great characteristic of the disease. The morbillous eruption being evanescent after death, we can only imperfectly trace its pathology. The exanthema is a small circular dot, similar to a flea-bite, slightly prominent, and sensible to the touch. Its colour is of a deep raspberry hue, and in some cases, as in the morbilli nigri, livid or black. In severe cases also, and especially if the patient be of a tender age, the exanthema assumes a papular form, and when at its height occasionally a vesicular form, and the latter is most common to those situated on the arms, the neck, or the breast. The colour of the exanthema is evanescent on pressure, but returns when that pressure is removed.

These exanthemata are extremely numerous, so that they leave but little of the healthy skin intervening between them, and they not unfrequently become confluent, and form either large maculæ, or else semi-lunar patches. The principal seats of the exanthemata are the face and back, while the parts least affected are the pudendal and popliteal regions. The inflammation producing the exanthemata extends in some degree to the subjacent cellular tissue; for the face is tumid and swollen, but not so as to close the eye-lids.

The eruption does not at once cover the whole body, but makes three successive attacks on different portions. There are consequently three crops of the eruption, each of which lasts from three to four days, while an interval of twenty-four hours usually intervenes between each crop. The course of the eruption then is, that it first appears on the third or fourth day of the primary fever on the face, neck, and upper extremities; on the following day on the trunk; and on the third day ensue the lower extremities, so that it is now full out over the whole body, or at its height. On the following day the eruption begins to decline, and each crop disappears in the order of the attack, and at similar intervals of time; for it fades first from the face and upper extremities, on the following day from the trunk, and lastly from the lower extremities. This inflammation of the skin

always terminates by resolution, when a furfuraceous desquamation takes place from the surface of the body generally. The duration of each crop is three days, which, with the intervals, makes the whole duration of the eruption, from its first appearance to its becoming evanescent over every part of the body, from six to seven days.

The affection of the mucous membranes in measles is constant in every case, except in one doubtful form of the disease, or in the *morbilli sine catarrho*. The inflammation of the mucous membranes of the eyes and nasal fossæ generally commences either with or before the primary fever, and, consequently, precedes the eruption by some days. This inflammation is, perhaps, for a few hours the congestive or the diffuse, but quickly changes to the serous ; for a profuse watery discharge from the eyes and nostrils shortly follows, which is termed the “*coryza*.” This affection usually continues till the decline of the eruption, and in some cases later. The inflammation of the mucous membrane of the mouth and fauces differs from that of the eyes and nose in not being accompanied by any discharge, and, consequently, it does not terminate in serous effusion. The affection of the buccal membrane indeed is exactly similar to the cutaneous eruption, for a number of exanthemata more or less confluent are seen on the palate, uvula, tonsils, and velum pendulum palati. They appear at the same time with the eruption of the face, neck, and upper extremities, and they decline when it disappears from the body generally. The inflammation of the buccal membrane always terminates by resolution.

The bronchial and tracheal mucous membranes are usually attacked either before or at the same time with the buccal membrane, but whether the inflammation of which they are the seat is marked by the same characteristic eruption is not determined, for few patients fall at this early period of the disease ; the secretions which accompany it, however, always partake of the same serous character as that of the nasal and ocular membrane, and, consequently, denote the existence of serous inflammation. They sometimes in the course of the

disease become purulent, and, in a few cases, Frank states that he has seen undoubted croup produced.

Towards the close of the disease, or even as late as the third or fourth day after the eruption has disappeared, the poison frequently falls on the substance of the lungs or on the pleura. Supposing it to fall on the cellular tissue or substance of the lungs, it usually excites serous inflammation of that tissue, and the quantity of fluid effused is frequently so considerable that it streams as from a sponge as soon as the lung is divided. In severer forms of the disease the poison may produce either the red or the grey hepatization of the lung, but these results are rare. The pleura does not at all times escape the action of the poison; and the diffuse, the serous, the adhesive, or the purulent inflammation may invade that tissue, and either destroy the patient, or prolong his convalescence.

Symptoms.—The symptoms of the measles result from the fever, and the consecutive local lesions produced by the action of the morbillous poison. The varieties of the disease, however, are extremely few; for no instance is known of a morbillous fever without the specific or secondary actions following; but the poison is supposed sometimes to limit its actions to one membrane, or to the cutis, and to exhaust itself on that tissue*—and hence the *morbilli sine catarrho*. The varying intensity, also, of the *morbilli* enables us to divide it into two grades, or into the *morbilli mitiores*, and into the *morbilli graviiores*. The arrangement of the forms of this disease will therefore be as follows:—

MORBILLI SINE CATARRHO. MORBILLI MITIORES.†

MORBILLI GRAVIORES.‡

The measles may make their attack suddenly, or be preceded for a few days with symptoms of a common cold:

* Rayer says that he has witnessed many times several children of the same family living in the same room, sleeping in the same chamber, labouring under "rougeole catarrhale," except, perhaps, one who had only fever and the eruption. Latour, also, states that he has recently attended a child labouring under measles, when the nurse was attacked with a similar eruption, but without fever, or any affection of the mucous membranes.—*Cours de Pathologie Interme*, par M. G. Andral, p. 482.

† Morbilli vulgares of Willan.

‡ Morbilli nigri of Willan.

in general the latter is the case. But neither the primary nor the eruptive fever are at any time of great intensity, and although many fall from the severity of the local lesions, yet no instance is known of the patient being overwhelmed or destroyed by the general depressing action of the poison, as in typhus or in scarlatina. The depressing powers of the poison, however, are considerable; and are always sufficient to confine the patient to his bed for a few days, and to leave him for a short time after the disease has subsided, weak and debilitated. The type of the fever in measles consequently greatly differs from that of typhus or of scarlatina; and the formidable brown tongue, so grave a symptom in the latter, is hardly known in the former, or only seen in a few fatal cases.

*Morbilli mitiores.**—The essential characters of this disease are that the poison produces fever, and acts on two membranes, or on the skin and mucous membranes.

The symptoms of the measles may be divided into three stages: the first embraces the period before the eruption, or that of the primary fever, and may last from three to five days; while the second stage embraces the period of the eruption, and lasts from six to seven days. These two stages very commonly comprise the whole disease, whose usual course is from nine to twelve days. The third stage includes the inflammatory actions caused by the tertiary actions of the poison, and, therefore, only occasionally exists. The tongue, it has been stated, rarely passes into the brown stage in any of these stadia.

The symptoms of the primary fever are seldom severe, and greatly resemble those of an ordinary, but severe catarrh; they are shivering alternated with heat, frequent pulse, head-ache, derangement of the bowels, sometimes accompanied with nausea and vomiting; and these affections are so considerable, that the patient usually takes to his bed. At the end of a few hours the fever becomes continued, and the specific action of the poison commences, by the mucous

* *Morbilli vulgares* of Willan.

membranes of the eyes and nose inflaming, so that the light is painful, the sense of smell and of taste lost, and this is followed by a copious discharge of a serous fluid from both organs. The buccal and bronchial membranes may become affected at the same time, and the patient is then troubled with a frequent cough, which, according to Frank, has this peculiarity—that it occurs in paroxysms, and does not remit till about the seventh day. The cough is often accompanied by hoarseness, by a sense of constriction across the chest, by diarrhoea, and sometimes by ischuria. The duration of this first stage is three, four, or five, and Home states that he has seen it last six days.

The second stage commences with the appearance of the eruption, whose course and character has been described. On the appearance of the eruption, the fever is often aggravated, but the distressing nausea and vomiting seldom last beyond the fourth day. The fever, therefore, together with the coryza, sneezing, coughing, hoarseness, and diarrhoea, continues with unabated severity till the eruption has reached its height, which is in the third or fourth day after its first appearance. From this period, in favourable cases, all the symptoms that have been mentioned begin to decline, and on the eruption disappearing, and the cuticle desquamating, the disease terminates about the ninth, tenth, or eleventh day from its commencement.*

* Willan has given in his Reports, (p. 106,) two remarkable cases of the fever and eruption occurring twice in the same person within a few hours. " In two cases of measles within the present month (June) a circumstance occurred which merits attention. The previous fever and the catarrhal symptoms having been moderate or rather slight, the eruption took place in the usual form on the fourth day, and was distributed over the breast and arms. It disappeared two or three days afterward, and no complaint seemed to remain. In the succeeding night, however, a violent fever commenced, and in the morning a fresh eruption appeared, which was diffused nearly over the whole body. This second disorder was attended with much fever, with inflammation of the eyes, and a constant, troublesome cough and diarrhoea. The eruption went off along with the fever, in four days. The cough and diarrhoea continued for some time longer. Thus the whole duration of the disease was twelve days, eight of which were occupied by two eruptions. Both of the above patients were confined, after the first appearance of the rash, to their bed-chambers, in which an uniform temperature was preserved, so that the renewal of the disease

In a few cases, however, on the subsiding of the eruption, or about the ninth, tenth, or eleventh day of the disease, and in some instances earlier, the tertiary actions of the poison are set up, and inflammation of the substance of the lungs or of the pleura takes place, and the symptoms of those diseases will now form part of the phenomena endangering the life of the patient, and prolonging the duration of the disorder. The inflammation of the bronchial membrane is denoted by the expectoration either of a thick, viscid mucus, or of pus, which may or may not be streaked with blood, while the sonorous or mucous rattle will point out the peculiar seat and extent of the mischief. If the substance of the lungs be inflamed, the breathing will be difficult, and the countenance livid, but the considerable affection of the mucous membrane and the loud rattle which accompanies it seldom permit us to hear crepitation, or to determine the absence of respiration. If inflammation of the pleura take place in addition to the cough, there will be severe pain of the affected side, the *point du côté*, or impossibility of filling the chest, except in a very limited degree, and also a small and frequent pulse. This inflammation may terminate either by resolution, by serous effusion, by throwing out of lymph, or by the copious secretions of pus. When effusion of fluid, of whatever description, has taken place into the cavity of the chest, the pain is mitigated, but a more fatal train of symptoms is substituted, such as the impossibility of lying down except on the affected side, an anxious countenance, an increased difficulty of respiration, together with dulness on percussion, and œgophony; symptoms which assure us of the amount of fluid effused, and of the great danger of the patient.

In some few cases, where the inflammation has been severe, and the depletion considerable, the poison appears to lay the brain under its influence, for the very able reporter of the diseases treated at the Newtown Dispensary,* says that he

" could not be caused by any check given to it in the first stage from exposure
" to cold. A double fever, and two successive eruptions, I never before re-
" marked in the measles, nor is it mentioned by any practical writer."

* Edin. Med. and Surg. Journal, vol. xv. p. 315.

witnessed two or three children that died with spasmodic affection, almost approaching to convulsions, without suffering much from dyspnœa ; while in two other cases in which the appearances on dissection were an inflamed state of the whole of the bronchia, with copious effusion into them, together with a small portion of one lung in each case so gorged with blood that it sunk in water,—the children died comatose ; and the physician alluded to speaks of this symptom as not unfrequently closing the scene on the third or fourth day after the disappearance of the eruption.

Between the fourth and sixth days there is often hemorrhage from the nose, and in females an appearance of the catamenia out of their course. These accidents are, perhaps, most frequent in particular seasons, for Frank states (p. 243,) that he attended 100 cases without any such occurrence.

Frank and Albers both state that the catarrhal symptoms have been frequently accompanied by cynanche trachealis, or croup.

The diarrhœa often continues throughout the whole of the disease, and sometimes to a troublesome degree.

*Morbilli graviiores.**—The characteristic of this severe form of measles is the exanthemata becoming suddenly black, or of a dark purple, with a mixture of yellow. The early writers on measles speak of this form of the disease being much more common in their times than we find it to be in the present. Sydenham considers this appearance as extremely formidable, and that persons so seized “are irrecoverably lost unless they are immediately relieved by bleeding and a cooler regimen.”† But Willan says that he has seen this discoloration of the eruption continue for ten days, with no other symptoms of fever than a quick pulse ; so that he considers this state of things as of less moment than Sydenham, but nevertheless admits he has seen one fatal case, (p. 237.)

Morbilli sine catarrho.—When the measles have been epidemic, a few cases have been observed in which the eruption and fever have constituted the whole disease ; the

* Morbilli nigri of Willan.

† Wallis's Sydenham, vol. i. p. 260.

mucous membranes being altogether unaffected either with coryza, or any other form of inflammation.

Frank rejects this form of measles as spurious, because it does not protect the constitution from a subsequent attack of the more ordinary form of measles. This reason would certainly be sufficient to induce us to acquiesce in the decision of Frank; but as the eruption has been identified by Willan, it seems proper, out of deference to so considerable an authority, to await the result of further observation.

Diagnosis.—The diseases with which measles may fairly be confounded, are scarlet fever, and some forms of syphilitic eruptions.

The diagnostic symptoms between scarlet fever and measles have been already described. The measles are distinguished from syphilitic eruptions by fever and coryza, which are wanting in the latter diseases.

Prognosis.—The mortality from measles greatly varies in different years. Percival* says, that out of 3807 cases, ninety-one died, or one in forty. Watson says, that in one year at the London Foundling Hospital, one in ten died, and in another, one in three. In the same establishment, also, in 1794, out of twenty-eight cases none died; in 1793, out of sixty-nine cases six died; in 1800, out of sixty-six, four died; and the aggregate of these data, taken collectively, will give a proportion of deaths to recoveries of about one in fifteen, which nearly approximates to the calculation of Home, who estimated them at one in twelve. The prognosis in the morbilli mitiores is consequently, in the early stage of the disease, at all times favourable. But the chances of recovery diminish under the following circumstances:—

The longer the preparatory symptoms, and the more violent they are, by so much the less mild will the distemper prove.

Spasms, or convulsions preceding the eruptions, especially in a child labouring under dentition, “magnum periculum portendunt.” (Frank, p. 252.)

The eruptive stage of the measles is not attended with

* Philosophical, Medical, and Experimental Essays, p. 108.

much danger either to infants or adults ; but should it assume the colour of the morbilli nigri, or be intermingled with petechiæ,* or ecchymoses, or should the eruption suddenly disappear, the prognosis is most unfavourable.

Diarrhoea continuing so long that the patient becomes pale and exhausted, is always unfavourable ; a moderate diarrhoea is of little moment, and occurring about the tenth day it is salutary.

A moderate hemorrhage from the nose or uterus is by no means hurtful. (Frank, p. 252.)

Adults, as well as children, have in some cases hectical paroxysms twice in the twenty-four hours, without any cough or diarrhoea, and during the interval there is great restlessness, panting, and a quick, irregular pulse. The patients, when thus affected for two or three successive weeks, generally sink under the complaint. The fatal termination seems, however, to be avoided by the appearance of boils, pustules, or suppurating tubercles of the skin. It is also alleviated by suppuration of the meatus auditorius, or of the lymphatic glands.

The danger of the measles is imminent when the secondary actions of the poison fall with any degree of severity on the lungs.

The favourable circumstances are, long protracted sleep, and gentle perspiration ; also, if the cough be accompanied by healthy sputa, and the urine deposits a healthy sediment.

The measles are far less dangerous to pregnant women than either the scarlet fever or small-pox. "I have attended "several," says Heberden,† "who were greatly harassed by "the violence of all the usual symptoms, but I never knew "them make one woman miscarry, or be in more danger "on account of pregnancy."

* Willan gives the case of a child, who had been previously affected with hooping cough, in which the rash was succeeded by numerous livid spots diffused nearly over the whole body, and resembling those of the purpura or the petechiæ sine febre in their most dangerous form. No harm, however, ensued, and the disease was removed in about eight days.—*Reports*, p. 189.

† Comment. p. 271; and Med. Trans. vol. iii. p. 404.

The measles are more fatal in the winter than in the spring, the summer, or the autumn.

The co-existence of measles with hooping-cough, or of measles with small-pox, is most commonly fatal, especially in winter.

Treatment.—The measles differ from scarlet fever in two very remarkable circumstances; or in their running a shorter and a more definite course, and in their having no tendency to terminate in ulceration or in mortification. The measles, consequently, though depending on a morbid poison, approximate to the phlegmasiæ compared with scarlet fever, for the constitution is little impaired by the short continuance of the disease, which admits of a more strictly anti-phlogistic treatment.

As there is no known antidote to the poison of measles, the indications in the cure of the morbilli are, to alleviate unfavourable symptoms as they arise; always remembering, even when the local lesions are most severe, that they depend on the action of a morbid poison, have a certain course to run, and are, consequently, less amenable to anti-phlogistic treatment than similar lesions, depending on simple inflammation.

The morbilli sine catarrho are usually so mild a disease as to require no other treatment than a milk diet, and the customary attention to the bowels; but the cough, the frequent vomiting, and the catarrhal symptoms, which so generally attend the primary fever of the morbilli mitiores, render medical assistance necessary from the first moment of attack. The symptoms of the primary fever, and also of the eruptive stage, as long as the patient continues free from any serious inflammatory affection of the lungs, do not require active treatment, and our object consequently must be limited to alleviating the cough, the vomiting, and the catarrh, by some of the large class of neutral salts, which afford so many useful remedies. In making our selection from these we must be principally guided by the state of the bowels, and the condition of the stomach. If the bowels be constipated, the milder purging salts, as the sulphate of magnesia, or the sulphate of soda in 3ss. or 3j. doses, ex mist. camphoræ 6^{tis}. vel

4^{tis.} horis, are to be preferred. On the contrary, if the patient be purged, and the vomiting distressing, the *mistura potassæ citratis effervescens*, is the most beneficial. There are many persons in whom the cough and catarrhal symptoms are the most urgent, and in such cases the *liquor ammoniæ acetatis ʒss. ex aqua menthæ*, from its more powerful action on the skin, is an excellent substitute. Another remedy equally, and perhaps even more useful in these cases, is ipecacuanha, of which gr.j. vel gr.ij. may be given 6^{tis.} vel 4^{tis.} horis. Many practitioners are in the habit of prescribing antimony in preference to ipecacuanha; but as antimony has a tendency to act on the lungs, and to produce, as far as my observation has gone, mortification of their substances, it certainly is prudent to forego the use of a medicine which must predispose those organs to the action of the poison.

The treatment which has been specified is, in many cases, all that is necessary throughout the whole course of the disease; and the greatly extended experience of Willan hardly enabled him to enlarge it. He thinks, however, (p. 229,) that "an emetic* given on the second or third "evening *somewhat* alleviates the violence of the catarrhal "symptoms, and contributes to prevent the diarrhoea which "usually succeeds the measles." "During the eruption," he adds, "I have not observed any considerable effect from "antimonials, or other diaphoretics. Bathing the feet every "evening seems a more beneficial application. Emulsions "and mucilages afford but a feeble palliation of the cough "and difficulty of breathing."

The catarrhal symptoms are frequently accompanied, even in the very first days of the disease, with much bronchial inflammation, and sometimes with pneumonia; or these affections may occur at any later period, more commonly after the decline of the eruption, or from the tenth to the twelfth day of the attack. This great tendency to pneumonia

* Willan's Reports on the Diseases in London, p. 38. Dr. Fothergill's plan of administering repeatedly antimonial emetics, though on many occasions advantageous, is not found so generally successful as has been stated by him in the Medical Observations and Enquiries, vol. iii. p. 179.

has caused the question to be agitated, whether bleeding ought not to be adopted as part of the treatment of this disease in all cases, either as a means of cure or of precaution ; or whether it should be reserved till the pneumonic symptoms are present. The theoretical deduction certainly is not to bleed until the local disease necessary to be combated is actually in existence, lest by the abstraction of the blood we only the more predispose the patient to the secondary actions of the poison ; and perhaps the greatest weight of medical authorities is in favour of the practice deduced from theory.

Sydenham appears to be of opinion (vol. i. p. 263,) that "the violent fever, difficulty of breathing, and other symptoms which usually affect such as have a peripneumony," are almost exclusively owing to the use of cordials, and of too hot a regimen *after the departure of the disease*; and in these cases he adds, "I have with great success ordered even " the tenderest infant to be bled in the arm, and in such " quantity as their strength and age indicated, and sometimes " also when the disease has been urgent, I have not feared " to repeat the operation, and, in reality, by bleeding, I have " snatched abundance of children from imminent death." It appears, (p. 264,) that Sydenham also bled when the measles were at their height. Cullen tells us, that "in measles the " danger arises chiefly from the coming on of an inflammatory " affection. But as the symptoms of pneumonic inflam- " mation seldom come on during the eruptive fever, and as " this fever is sometimes violent immediately before the " eruption, though a sufficiently mild disease be to follow, so " bleeding is seldom necessary during the eruptive fever, and " may often be reserved for periods of greater danger, which " are perhaps to come." Willan's* opinion corresponds with

* The authority of Drs. Willan and Bateman is adverse in general to bleeding early in measles, because "oppression of respiration, with labouring pulse on the first or second days of the eruption, usually disappear in the course of twenty-four hours." "But," adds Dr. Bateman, "when the eruption has disappeared, and the cough, and pains of the chest, with difficulty of breathing, become severe, bleeding and cupping may be repeatedly necessary. "It has, however, appeared to us, says the reporter for the Newtown Dispens-

those of Sydenham and Cullen. He says (p. 232), "On the third and fourth day of the fever, when there is oppression, with anxiety, heaving of the lungs, and a labouring pulse, most practitioners recommend bleeding in adults. I have not adopted the recommendation unless urged by the coincidence of a hard cough and pains in the chest. Those who, from doubt or from some collateral motive, are led to wait the event, usually find the pulse become moderate, and the uneasy, laborious respiration terminate in twenty-four hours. This oppressed breathing is indeed common to other eruptive fevers, and if it were universally to be considered an indication for bleeding, the practice would often be more fatal than the disease. When the efflorescence has wholly disappeared, and the cough, difficulty of breathing, and pains in the chest, are very severe, bleeding and cupping may, perhaps, be repeatedly necessary. Yet even in robust habits some limitation is requisite to this mode of practice, since it has not an effect in alleviating the symptoms equal to that which is experienced from it in pulmonic inflammations originating from cold; hence we should employ as auxiliaries at the latter period of the disease blisters, opium, and demulcent liquors." We may add to these authorities that of Hamilton, who never saw a case that required bleeding, and also of Mr. Murray, who found no occasion to bleed in Aberdeenshire, during an epidemic of measles.

Among the physicians who consider that bleeding should form a part of the curative treatment, are Morton, Mead, and Heberden; but even their recommendation of bleeding is not without some limitations. Morton* defers it till

"sary, that in severe cases of the disease, such as those now stated, bleeding after the disappearance of the eruption to such an extent as the remaining strength of the little patient seemed to justify, comes too late, and when the pneumonic symptoms at the height of the eruption are equal, although we admit there is no fixed proportion between their urgency at this time and their urgency afterwards, and although there is therefore a chance of their going off of themselves as the rash fades, yet on the whole we think there is less to be apprehended from immediate bleeding than from a delay even of twenty-four hours."

* *De Morbillis*, p. 154.

after the eruption is completed, the disease in his opinion being most inflammatory at that time. Heberden (p. 271) recommends it at any time of the measles where the symptoms are very distressing; "particularly an oppression of "breath, to which every stage of this distemper is liable, "bleeding, with such medicines as the occasional symptoms "would require in any other fever, is the whole medical "treatment required in measles." Mead, however, bled still more universally, for he says, "About forty years ago, the "measles raged with so great violence in the city, that they "were more fatal than even the small-pox. At that time, a "physician of great eminence came to me, desiring that I "would inform him what method I followed in this disease. "I asked him whether or no he used to take away blood. "He answering, No, because Sydenham very seldom did it, "I advised him to open a vein in the beginning of the dis- "temper; or, if he was called in late, as soon as he possibly "could; for, said I, this disease *always* brings with it a "peripneumony, which he very well knew required bleeding. "Not long after he met me again, returning me hearty "thanks for my counsel, assuring me that he had not lost "one patient whom he had treated in that manner. Since "that time this practice grew so common that it was followed "even by our apothecaries."

It will be seen that Mead assumes that measles always brings with it a peripneumony, which is not the fact; for that inflammation does not occur in one case in ten, and consequently if that be the only ground for bleeding, the operation must be totally unnecessary in a large proportion of cases, and ought to be omitted, lest, by debilitating the patient, it predispose him to the disease which it is intended to obviate. Bleeding, therefore, is not the rule in the treatment of measles. Still, however, it must be admitted that blood may be taken with much greater impunity than in any other of the exanthemata, for the course of the disease is shorter, and the fever universally abates on the eighth or ninth day with the eruption, unless prolonged by the occurrence of pneumonic symptoms. In all doubtful cases, therefore, it is

safer to bleed than to omit that operation, and when pneumonia or pleuritis actually exists, blood should be taken freely, but not extravagantly, for it should be remembered, that although some children bear the loss of blood well, that there are many others that bear it very ill, and are long in recovering its effects, even when the quantity taken has been small. In children, then, below ten years of age, it is more prudent to take blood frequently and in small quantities than to hazard the consequences that may attend the taking a large quantity at once. We should likewise be content with moderating the symptoms, for as the inflammation depends on the action of a poison, it has a course to run, and therefore does not admit of a sudden cure.* The bleeding also should be more moderate during the eruption than after its subsidence; for we have a right to look forward to a great mitigation of all the symptoms when it disappears. When bleeding is judged necessary in the adult female, menstruation being present ought not to prevent that operation, but it should be recollected that this is always a period of increased irritability and excitement, and produces an apparent aggravation of the symptoms, not requiring any free use of the lancet.

Blisters,† ipecacuanha, and mercury, are among the best adjuvantia to bleeding; and when the disease has well declined, opiates give considerable relief. Sydenham prescribed an opiate every night throughout the whole course of measles. But in the early stages it produces an increase of

* Bateman says, (*Diseases of London*, p. 198,) in some cases this inflammation destroyed the patient in two days, notwithstanding a pretty active evacuation of blood; in others effusion appeared to take place, and a difficult, wheezing, and quick respiration, with expansion of the nostrils, and constant cough, continued for many days, not in the least influenced by local or general blood-letting, blisters, nauseating or emetic doses of antimony and ipecacuanha, nor by any other expedient.

† Mr. Murray says, blisters put on the chest were found in several instances to remove the most laborious spasmodic breathing; even in the youngest children they were used without any bad effects, but they should remain on but a short time. One case was mistaken for scarlatina, and treated by cold affusion, and it produced the most severe affection of the chest witnessed during the whole epidemic.

heat and restlessness, without conciliating sleep. Opiates then are an occasional remedy, and require much judgment in their exhibition.*

The morbilli nigri are so rare a disease, that it is impossible to lay down any mode of treatment. Sydenham ascribes them to a hot regimen, and he bled; but he instances this treatment only by a single case, which recovered.

During the whole course of the disease, it is necessary to enjoin a low diet, with slops, which, if pleasant to the patient, may be drank tepid. The chamber should be of a moderate temperature, and not subjected to any sudden change from heat to cold.† Strict cleanliness should also be observed.

There is no known preventive treatment or remedy against the attacks of this disease.

* There is but one case which I am acquainted with on record in which a tonic treatment has been found necessary or beneficial in measles, and it occurred to Dr. Bateman, who states the fading efflorescence became mixed with a crop of petechiae. As there was apparently no local congestion, however, the decoction of cinchona with sulphuric acid, and a little wine, was administered, and the child speedily recovered.—*Diseases of London*, p. 198.

† Willan has recorded the symptoms of a case in which the eruption of the measles was repelled, soon after its appearance, by exposure to cold. He states (*Reports on the Diseases of London*, p. 100,)—"A most violent fever ensued; the pulse became small, quick, and irregular—the tongue was moist, though furred—the eyes dull and heavy—the skin pale and livid—the skin generally cold. She had a slight cough; her breathing was generally laborious, and attended with a rattling in the throat, owing to an increased secretion of phlegm from the lungs. She was usually comatose, but when disturbed extremely fretful and querulous. She drank only milk and water, and took no other food, nor any medicines. The above symptoms continued for about four days, and she died on the ninth day of the disease.

V A R I O LÆ,

Or the Small-pox, is a disease consisting of a remittent fever, of an eruption which runs a given course, and of certain occasional tertiary affections. The poison has the property of exhausting the susceptibility of the constitution to its future action on the first attack.

OF THE POISON OF THE SMALL-POX.

THE small-pox, from the marked character of the eruption, the singularity of its laws, and the great mortality that has attended it, is unquestionably the most remarkable of the exanthemata, and its history has been a subject of deeper interest and of greater research than that of scarlet fever or of measles.

In investigating the early history of the small-pox, there are some obscure traces of its having been imported into Arabia from the more distant regions of the East; for the Père d'Entrecolles,* a missionary Jesuit, states that he found a disease, which he conjectures to have been the small-pox, mentioned in some Chinese writings as of high antiquity; while Mr. Holwell, a Bengal surgeon, affirms that the Brahmins trace it in their records for 3366 years. In these eastern histories, however, the description of the disease supposed to be the small-pox, is by no means satisfactory, or admitting it to be correct, there is much reason to doubt the accuracy of the annals; for how could Europe have escaped for so long a period a disease so infectious, considering the frequent intercourse kept up with India by the Jews, the Greeks, and the Romans? With this difficulty unexplained we are justified in rejecting these stories as fabulous, and in esteeming the Hindoo and Chinese chronicles, in this respect, as most erroneous.

It appears from the researches of Reiske, and from some Arabian manuscripts found by that adventurous traveller, Mr. Bruce, that whatever country gave origin to the small-pox, it broke out in Arabia at the siege of Mecca, in 569,†

* Lettres edifiantes et curieuses, tom. xxi. p. 83, ed. 1781.

† The siege of Mecca, according to Mr. Gibbon, took place only two months before the birth of Mahomet.

and that the Arabian army commanded by Abrahah was the first victim of its fury. Alexandria, the great mart of eastern commerce, was soon infected, and hence it was conveyed by the Arabians or Saracens, in their warlike expeditions, to the northern coasts of Africa, and on their invasion of Sicily, Italy, France, and Spain, in the eighth century, all Europe became contaminated.

The time when the contagion of small-pox spread into Great Britain is involved in some doubt. Most writers refer it to the times of the crusaders, and to the return of our ill-fated warriors from the Holy Land in the thirteenth century. Dr. Woodville, however, reflecting on the known activity of the poison, and the long time that fomites retain their infectious properties, conceived it to be impossible that the small-pox could prevail on the neighbouring continent for so many centuries, and not be introduced into this country. He was led, therefore, to examine some old manuscripts in the British Museum, bearing indubitable evidence of their having been written before the ninth century, and he found distinct mention of the small-pox as existing at that time both in this country and on the continent. In these curious records he says the word *variolæ* occurs several times in the sense in which we now use it, and that they contain many exorcisms, prayers, and incantations, to which the people of those times had recourse for preservation against this pestilence. The first British medical writers of any note are not earlier than the thirteenth century, and they, as well as their successors, from John of Gaddesden to Sydenham, have all treated of this important distemper.

Since the appearance of the small-pox at Mecca, two great epochs have occurred in its history: the first is the discovery of the singular and beneficent law that the destructive agency of this poison is greatly mitigated by introducing it into the system by means of the cutaneous instead of the mucous tissues; and secondly, the still more wonderful fact that the vaccine poison, though differing in many remarkable circumstances from the laws of the variolous poison, has the extraordinary and unlooked-for property of protecting the

constitution, and rendering it altogether unsusceptible of the action of that latter deleterious agent.

The country in which the practice of inoculation first originated is not determined. The Chinese claim to have adopted the custom of *sowing* the small-pox, or of inducing the disease by thrusting a small-pox crust up the nose, as early as 990.* The Brahmins of Hindostan, if their traditions are to be relied on, also practised inoculation from a very remote antiquity.† The operation is said to have been performed by a particular tribe of Brahmins, who travelled over all the provinces, and, dividing themselves into small parties of three or four, went from house to house. Their practice was to prepare the patient by restricting him, for some short time previous to inoculation, to a low diet, which was continued during the course of the disease. The men were inoculated in the fore arm, and the girls, who did not choose to have their person disfigured, in the upper arm. But whatever part was fixed upon, they first rubbed it with a piece of cloth, which afterwards became their perquisite. A few scratches were then made with a sharp instrument, and a piece of cotton soaked the preceding year in the variolous matter, and now moistened with a drop or two of the holy water of the Ganges, was bound over the punctures. The subsequent treatment consisted in pouring two gallons of cold water over the head of the patient every morning till the fever came on, (usually about the sixth day,) which was then desisted from till the appearance of the eruption, when it was again resumed. They also directed the patient to live in the open air, and to expose himself during the whole course of the disease to every wind that blew, and as soon as the pustules began to change their colour, to open them with a sharp-pointed thorn. These directions given, the operator took his leave and his fee, which from a poor person was equal to about a penny, and passed to another door.

* Mémoires concernant l'Histoire des Sciences et des Chinois, par les Missionnaires de Pekin, tom. iv. p. 392.

† Essai Apologétique sur la Méthode de communiquer la petite vérole par inoculation, par M. Chois; and also the manner of practising inoculation in the East Indies, by J. Z. Holwell, 1767.

"When the Hindoo practice is strictly followed," says Mr. Holwell, "it is next to a miracle to hear that one in a million fails to receive the infection, or of one that misses carries under it. Of the multitude I have seen inoculated in that country, the number of pustules has been seldom less than fifty, and hardly ever exceeded 200." This testimony of Mr. Holwell of the practice of inoculation being general throughout India so early as fifty years after its first introduction into this country, almost distinctly proves it to have long existed in Hindostan; for in no part of the world are the natives so slow to change their customs, or possessed of such strong prejudices in favour of ancient usages.

But whether India be entitled to the discovery or not, it appears from a number of travellers that inoculation was long practised in Persia, Georgia, and Greece, without its being known whence the custom originated. In the year 1706, however, inoculation was introduced into Constantinople by a Greek woman, a native of the Morea,—"an expedient which was the safety of many," for a fatal kind of small-pox then raged in that city, Pera, and Galata.* Her method was to make eight or ten small incisions under the skin fit to imbed the dry crust of a pustule taken from a person in a state of convalescence.

Reports of the success attending this practice reached England, in 1713, from Dr. Emanuel Timoni, a native of Constantinople, but who studied and graduated both at Oxford and at Padua; and his account was published in the Philosophical Transactions for 1714-1716. A similar account also reached Venice from Signor Pylarini, a physician and Venetian consul at Smyrna, and was first published at Vienna in 1715, and afterwards in the Philosophical Transactions; and these favourable accounts were confirmed by Mr. Kennedy, an English surgeon, who had travelled into Turkey; the operation being named by him "engrafting the small-pox."†

* Letter to Sir Hans Sloane from Dr. Terny, in Moore's History of the Small-pox, p. 230.

† Essay on External Remedies, 1715.

Notwithstanding these strong recommendations, it does not appear that the experiment of inoculation was made in any one case either in England, Venice, or other neighbouring country; and the subject perhaps had been forgotten but for Lady Mary Wortley Montague. This charming and accomplished woman travelled into Turkey with her husband, appointed ambassador to the Ottoman court; and in one of her celebrated letters, dated Adrianople, 1717,* she playfully writes,—“ Every year thousands undergo this operation (of “ inoculation), and the French ambassador pleasantly says, “ that they take the small-pox here by way of diversion, as “ they take waters in other countries. There is no example “ of any one having died of it, and you may believe I am “ well satisfied of the safety of this experiment, since I in-“ tend to try it on my dear little son.”

The curiosity of Mr. Maitland, surgeon to the embassy, was also excited; and he tells us that he made use of the opportunities his position afforded, to ascertain three great points connected with the practice of inoculation.—First, that the natural small-pox at Constantinople was even a severer disease than in this country, one-third to a half of those seized dying of it.—Secondly, that the inoculated small-pox was always a comparatively mild disease, the fever accompanying it scarcely deserving the name of “ febricula,” while the number of pustules commonly varied from ten to 100; and lastly, that although several had been once and again “ engrafted,” and others also confined to the same room, and even made to sleep in the same bed with the infected, he could trace no instance of re-infection: These inquiries of Mr. Maitland, added to those she herself had made, induced Lady Mary Wortley Montague “ *to order* ” Mr. Maitland to procure a proper subject to inoculate from. This was done; and her son was inoculated by a Greek woman, and the experiment happily and completely succeeded.

The embassy returned to England in October 1818; and it is certainly much to the discredit of Mr. Maitland that he does not appear to have made any attempt to introduce, or in

* Letter xxxi. April 1717.

any way make known, the advantages of inoculation. But the subject had not slept in the mind of Lady M. W. Montague. Circumstances had prevented her from inoculating her second child, as she intended, at Constantinople; and, owing to this accident, she was destined to set the first example of inoculation in England. "In April 1721," says Mr. Maitland, "she sent for me, and when I came, told me she was *resolved* "to have her daughter inoculated, and *desired me forthwith* "to find out matter for the purpose." The child was inoculated, and the experiment was permitted to be witnessed by three physicians of the college, and by several ladies of the court, and other persons of distinction. The result was triumphantly successful, so that, in the May following, Dr. Keith, one of the physicians who had visited Miss Wortley; and who had formerly lost some children in a very malignant kind of small-pox, requested Mr. Maitland to engraft his only surviving son; and this case also succeeded. Sir Hans Sloane, the President of the College of Physicians, shortly after had his two grandsons inoculated, and also encouraged the inoculation of the Duke of Bedford and his sister. Dr. Perrot Williams also submitted two of his sons to the same practice, and their examples were followed by other Fellows of the College.

These cases excited great interest, and Caroline Princess of Wales was desirous of having her children inoculated; to which she was the more inclined, as one of her daughters, the Princess Anne, had nearly lost her life by the natural small-pox. Still not satisfied with these experiments, her Royal Highness obtained from George the First that six condemned criminals should be pardoned on condition of submitting to be inoculated; and a seventh was added to them at the request of Dr. Mead, in order that the Chinese method of producing the disease, by thrusting a small-pox crust up the nose, might be tried. Mr. Maitland operated, and all took the small-pox except one, who it was afterwards discovered had had the small-pox, but had dissimulated, and was consequently not susceptible of the action of the poison. The disease was mild in all, with the exception of the party treated by the Chinese method, and who had it more severely.

Thus encouraged, her Royal Highness ordered her two children to be inoculated; and as the result was favourable, Mr. Maitland was afterwards sent to Hanover to inoculate Prince Frederick.

Medical men were now beginning to be agreed on the great value of inoculation, when some zealous churchmen, conceiving that it was repugnant to religion, and a daring attempt to interrupt the eternal decrees of Providence, wrote and preached against it. But Dr. Doddridge, Dr. Maddox, the Bishop of Worcester, Dr. Jurine, and others, convinced by every fact, and by every calculation, that inoculation ultimately tended, in a remarkable degree, to the preservation of human life, maintained that this operation was not only void of sin, but that it was the bounden duty of every Christian to encourage it to the utmost of his power; and their arguments prevailed, and the practice sensibly gained ground in the higher ranks of life. The expense, however, and confinement which necessarily attended even the mitigated form of disease thus produced, placed this boon in a great measure beyond the reach of the lower orders, and greatly limited its utility. But the public feeling was roused, the great value of the discovery in some degree appreciated, and an hospital for inoculating the poor, and for the reception of persons already infected with the small-pox, was founded in London in the year 1746. This establishment was, however, much too small to effect its object, since it could only receive fifteen persons at a time, while, from the causes that have been mentioned, only 131 persons had submitted to be inoculated there in five years; and the practice perhaps had languished, and fallen into disrepute, had not the College of Physicians, in 1754, published a strong recommendation of the operation, declaring that experience had refuted the arguments urged against this practice, and that the college considered it highly beneficial.*

There was a noble disinterestedness in this declaration which greatly contributed to give confidence to the public

* Taylor Oratio Harvien.

and to the profession, but nevertheless it required all the popular artifices of the empiric to extend the practice; and the Suttons and others, with their secret methods, and their infallible power of preventing too great an eruption of pustules, propagated inoculation more extensively in half a dozen years than all the faculty of medicine and surgery, with the aid of the church, and the example of the court, had been able to do in half a century.

From England the practice of inoculation passed rapidly into America, where it was extensively adopted; but so slowly did it make its way in Scotland, that Professor Monro calculated, in 1765, that, on an average of thirty-one years, only 108 persons had been inoculated throughout all Scotland. He was able also to estimate that the fatal cases had been only as one in seventy-eight. The English accounts of inoculation were soon translated into many foreign languages; but it does not appear that any person was inoculated in France till more than three years after the practice had been introduced into England. At first it was almost entirely neglected, nor did it flourish in that country till Turgot, the celebrated minister of French finance, countenanced and again revived it. From this period it slowly spread from Paris to the principal cities of the provinces, and, after many obstacles, at length established itself over the whole of Europe.

The mortality from small-pox had been greatly reduced by the introduction of inoculation among the class of patients who had actually been submitted to the operation. But nevertheless it was soon proved that the practice of inoculation caused the infection to spread more widely, so that the aggregate mortality from small-pox was even considerably increased;* for many heads of families continued obstinately prejudiced against inoculation,† many

* The number of deaths from the natural small-pox was estimated, at this period, as one in five of those attacked, while, in those who had submitted to inoculation, according to Baron Dimsdale, not one in 1500 perished. The Suttons profess to have inoculated 20,000 persons without a single fatal casualty. Perhaps the more correct estimate is that of Dr. Woodville, who states that, out of 5000 persons inoculated, the deaths were one in 600.

† Dr. Willan states, that "the numbers inoculated at the Small-pox Hospital

were altogether wanting in foresight, and neglected to avail themselves of its advantages, and many could not, even with gratuitious medical assistance, afford the time and expense incident to it. From these causes a large class of unprotected persons continued to exist in every country, and the natural small-pox consequently spread more widely than before the introduction of the practice of inoculation, which established so many new centres of infection. The fact contended for was distinctly proved by documents delivered in to the Committee of the House of Commons by Dr. Lettsom, and founded on deductions from the bills of mortality,* from which it appeared that in the fifty-five years preceding the introduction of inoculation, or between 1667 and 1772, the average number of deaths occasioned by the small-pox was, to the number of persons that had died of all diseases, only as seventy-two to 1000, while, in the forty-two years succeeding the practice of inoculation, the proportion had increased to eighty-five in the 1000; and subsequently Sir Gilbert Blane has calculated, that in the last thirty years of the past century it had increased to ninety-five in 1000; adding, that in the year 1800, the small-pox had broke out twenty times in the Channel fleet alone.†

in 1797 was only 1300, of whom two died; in 1798, 2322, of whom three died; and in 1799, 2342, of whom four died;—being certainly not one-tenth of the number of births annually.”

* Dr. Willan, in his Reports, (p. 68,) states—“ In the general bill for the year “ 1796 it appears that 307 have died of the measles; 3548 of the small-pox, and “ 1547 of other acute disease. On examining the bills of mortality from the year “ 1628 to the present time, it will be found, that at some period, a greater “ number has died within twelve months; but in 1796, the proportion of deaths, “ from this complaint, to the whole annual mortality, has exceeded that of any “ preceding year. The only year in which deaths by the small-pox amounted “ to more than 3000, are the following:—

	Total No. of Deaths.	By the Small-Pox.
1725	25,523	3188 or 125 in 1000
1736	27,581	3034 — 100
1752	20,485	3538 — 172
1757	21,213	3296 — 154
1763	26,143	3582 — 137
1768	25,639	3028 — 128
1772	26,053	3992 — 153
1796	19,288	3549 — 183 ”

† “ The small-pox,” says Dr. Willan, “ during the whole of the last spring

The calculations of Lettsom and of Blane, supposing the population of this country at that time to have been no more than twelve millions, would give an annual mortality, from small-pox alone, of no less than from 10,000 to 15,000 persons, inhabitants of the British islands. In France, the Minister of the Interior, in his introductory report of the Committee of Vaccination in 1811, stated that country had formerly sustained an annual mortality of 150,000 persons from the same cause; and, notwithstanding the extensive prevalence of vaccination, 8500 persons had perished in that year from small-pox. This great and continued mortality from small-pox, even after inoculation seemed to be most firmly established and most extensively practised, was not perhaps the greatest evil it inflicted on the community; for of those that survived this pestilential disease, many fell blind, many lame, and in a much larger number it sowed the germs of latent constitutional disease, which became the bane of their future existence.* There was no object, therefore, in medicine more ardently desired than that some means might be devised by which this formidable malady might be entirely and for ever exterminated.

At the time, therefore, when the benefits of inoculation were most extensively diffused, but with results so disproportioned to the great value of the discovery, Jenner, who practised in the dairy county of Gloucestershire, was led by popular rumour to investigate the supposed prophylactic power of the vaccine poison in this disease, and his experiments have demonstrated that it does possess the wonderful property attributed to it, and as a general principle does protect the constitution against the actions of the small-pox poison; and

"(1796), was the leading epidemical complaint in London and its vicinity.
"The disease continues to rage with unabated violence; and since the hot
"weather commenced, has appeared in its most malignant form, proving
"generally fatal."—P. 31.

* As sequælae of the small-pox, Dr. Willan enumerates glandular swellings, ulcers, often gangrenous, about the thighs, scutum, and knees, puffy tumors of the soft parts, enlargement of the bones, stiffness of the joints, ophthalmia, deafness, cough, dyspncea, diarrhoea, anasarca, hydrothorax.

this great discovery forms the second epoch in the history of this eventful disease.

Edward Jenner, the son of the Rev. Stephen Jenner, rector of Rockhampton, and vicar of Berkley in Gloucestershire, was born May 17, 1749. On the death of his father, Edward, when of a suitable age, was apprenticed to Mr. Ludlow, a surgeon at Sodbury near Bristol. In the course of his connexion with that gentleman, it is stated that a young woman coming to the shop, and the conversation falling on the danger of the small-pox, she said, "I cannot take the disease, for I have had the cow-pox." This observation, as it coincided with the opinion popularly entertained in Gloucestershire, rivetted the attention of Jenner, and made a great impression on his mind.

His articles having expired, Jenner came to London to complete his professional studies, and was received into the house of John Hunter, with whom he resided for two years. The minds of these two eminent men, though not equally matured, were of a kindred nature, and an intimate friendship was cemented, and an epistolary correspondence commenced between them, that lasted till the death of Mr. Hunter. The usual routine of his education being completed, Jenner returned to practise in his native town of Berkley, his mind often brooding over his favourite subject, or the possibility of his being able to demonstrate the preservative powers of the cow-pox against the small-pox, and of his being perhaps thus destined by Providence to exterminate from the world one of its greatest calamities. This great subject, which he had often mentioned to Mr. Hunter, formed for many years the constant theme of his conversation at his medical club; but some having instances of supposed failure to relate, while others disbelieved it altogether, the members jocosely threatened to expel him, unless he abandoned the topic. This theme, however, though often talked of, lay long without fruition, or any attempt on the part of Jenner to prove it by experiment. But at length, his practice having increased, he felt himself entitled to assume a higher grade in his profession, and in 1792 he took the

degree of Doctor of Physic at St. Andrew's. In this new position his greater leisure enabled him practically to investigate the subject which had for so many years been the favourite object of his thoughts, and which he appears to have been more particularly destined to accomplish.

In the year 1795, therefore, Jenner prevailed on fourteen persons, who had previously, as was supposed, had the cow-pox, and some even at very distant periods, as, for example, one 25 years ago, another 27, and a third as long as 53 years, to submit to be inoculated for the small-pox; but, as he had anticipated, not one took the infection. His next experiment was in May of the same year, when he vaccinated a boy direct from the cow, and in the July following he inoculated this lad for the small-pox; but the infection, as in the former cases, failed. This result was of great value, for Jenner had not only another instance in proof of his favourite hypothesis, but he also determined the particular disease of the cow which communicates the cow-pox to the human subject; so that he was now enabled to distinguish it from the many spurious affections to which that animal is subject.

The disease among the cows subsiding at this time, his further experiments were delayed for three years, or till March 1798, when they were again resumed. His object was now to determine whether the cow-pox could be transmitted from one human subject to another without its protective influence being in any degree impaired. In March 1798, therefore, he vaccinated a child from a man labouring under the cow-pox; and from this child he vaccinated another, and from that a third, and so on through five gradations, and he had the satisfaction of seeing the pustule perfectly reproduced in all. These cases he subsequently tested by inoculation with small-pox matter, and they all proved unsusceptible of the disease. Jenner was now satisfied that he had a strong case, and he therefore ventured, in 1798, to publish his inquiries into the causes and effects of the variolæ vaccinæ, in which he stated his conviction that the cow-pox would be found an absolute protection against the small-pox,

and that the exceptions would be extremely few; for he boldly asks, if one person in 100 be liable to the small-pox after cow-pox, will that, on weighing the amount of comparative mischief inflicted by the two diseases, invalidate the practice?

This work was published in June 1798; but, before it issued from the press, he, on the 24th of April, came to London, where he remained till the 12th of July; and it will scarcely be believed that, during this period of nearly three months that he remained in the metropolis, he was unable to induce a single person to submit to be vaccinated. On leaving town, however, he left a supply of the virus with Mr. Cline, who, towards the end of July, vaccinated in two places of the hip a patient who was labouring under disease of that joint, and on the supposition that counter irritation might be useful, and that the pustules might serve for the insertion of peas, as in an issue. The cow-pox was produced, and on Mr. Cline subsequently inoculating this person in three places for the small-pox, his constitution was found unsusceptible of the action of that poison.

Mr. Cline at once perceived, from the result of this experiment, what incalculable benefits were likely to ensue from the diffusion of the practice; so that he wrote to Dr. Jenner, advising him to quit the country, and to take a house in Grosvenor square, assuring him of 10,000*l.* per annum as the profits of his future practice. But how little the ordinary objects of wealth and distinction are in unison with a philosophic mind, may be seen in Jenner's answer:—“ It is “ very clear from your representation, that there is now an “ opening in town for any physician whose reputation stood “ fair in the public eye. But here, my dear friend, is the “ rub. Shall I, who, even in the morning of my days, “ sought the lowly and sequestered paths of life—the valley, “ and not the mountain—shall I, now my evening is fast “ approaching, hold myself up for fortune and for fame? “ Admitting it as a certainty that I obtain both, what stock “ shall I add to my little fund of happiness? My fortune, “ with what flows from my profession, is sufficient to gratify

" my wishes. Indeed, so limited is my ambition, and that
" of my nearest connexions, that were I precluded from
" future practice, I should be enabled to obtain all I want;
" and as for fame, what is it?—a gilded butt, for ever pierced
" with the arrows of malignancy. The name of John Hunter
" stamps this observation with the signature of truth."

Such was the answer of Jenner to the splendid allurement held out to him; nor was he persuaded to leave his beloved retirement until the mistakes into which the first vaccinators fell, in their attempts to propagate a disease entirely new to them, drew him to London to protect his own fame, and to secure to the public the full benefit of his discovery.

The error, which seemed for a moment to present a fatal obstacle to the progress of vaccination, was, that the first experiments in vaccination in London were made on patients admitted into the small-pox hospital, and consequently obliged to breathe, during the latent period of the cow-pox infection, the variolated atmosphere of the hospital; so that, out of sixty-two patients vaccinated, it happened that fifty-seven had variolated pustules. It was therefore for a time imagined that the cow-pox virus produced an eruption over the whole body, and one in no respect milder than the inoculated small-pox.

The impropriety, however, of vaccinating patients in a small-pox hospital having been pointed out, and the error rectified, Jenner had the satisfaction of being able to state, in a third pamphlet which he published in 1800, that upwards of 6000 persons had now been vaccinated, and that the greater part of them have since been inoculated for the small-pox, or exposed to its infection in every rational way that could be devised, and without (p. 96) taking that disease.

The triumph of Jenner was consequently complete. The College of Physicians made a most favourable report of the utility of the discovery, which was supported by the concurrent testimony of the other colleges of physicians and surgeons in the united kingdoms. Several societies also were established, to extend more widely the practice of vaccination; and parliament at two different times voted him the sum of

30,000*l.*—an amount which, considering the large sums so often and so lavishly bestowed for far inferior services, must be considered as a tribute to science, rather than as a reward for a great benefit bestowed on his country, and on mankind at large.

The practice of vaccination has, since that period, been extended to every part of the world, and has every where been received with that thankfulness which so wonderful a discovery deserves. By it a mild disease has been substituted for one the most virulent and loathsome; a simple contagious disease, for one that is both contagious and infectious; a local disease, for one that was general over the whole body; and one that leaves no taint upon the constitution, for one that often sowed the latent germs of the most fatal disorders. A long subsequent experience has fully confirmed the general law deduced by Jenner, that the cow-pox is a certain protection against the action of the variolous poison. It must be confessed, however, that to this law there are exceptions, but still so few, that it only requires the practice of vaccination to be persevered in, ultimately and entirely to eradicate the most formidable pestilence that has ever depopulated the earth.

It will now be proper to treat first of the natural small-pox, and of its varieties; then of the inoculated small-pox; and lastly, of the small-pox after vaccination.

Remote Cause.—The remote cause of this disorder is entirely unknown. It is almost certain, however, if not absolutely demonstrated, that the poison in the present day does not exist independently of human contagion; for the small-pox being occasionally more prevalent in one year than in another, is hardly a sufficient argument for adopting the hypothesis of the poison being diffused generally throughout the atmosphere.

Predisposing Causes.—There are so few persons susceptible of the action of this poison, who escape infection when exposed to its influence, that the subject of predisposing causes has not been much studied. There are circumstances, however, not easily appreciable, which do predispose to this

disease. For example, a gentleman long accustomed to frequent the small-pox hospital, and even to make drawings from the variolated dead body with impunity, took the disease from his being accidentally in the same room with one. A nurse also long attached to that hospital, and in constant attendance on the small-pox patients, went into the country for a short recreation, but, on her return, she became infected, and passed through the disease.

But the disease once engendered, the person of the patient generates a poison which infects all the secretions of his body. This poison is capable of being diffused through the atmosphere, and of thus communicating the disease. It is also intimately combined with the serum, the pus, and crusts of the pustules, for either of them being placed in contact with the cutis, or with any other tissue of the body, the disease follows almost as a necessary consequence. The small-pox is therefore both contagious and infectious. The virus also is capable of contaminating most substances with which it is brought in contact, and the disease consequently is capable of being propagated by fomites.

Infectious.—The infectious nature of the small-pox is so universally admitted, that “to expose a person in a public highway, infected with this contagion, is considered in law ‘as a common nuisance, and is indictable as such.’”* The circumstance, however, which establishes this law beyond all question, is, that the poison being diffused through the atmosphere, and absorbed into the system by means of the mucous membranes, causes a much more severe and fatal form of the disease, or the “*natural small-pox*,” than when the poison is absorbed by the cutaneous tissue, and produces the inoculated small-pox. We also often see this disease spread in our hospitals, and under circumstances which do not allow us to imagine that it has been communicated by actual contact.

Infecting Distance.--The distance the poison may extend around the patient's person, before it becomes so diluted by admixture with atmospheric air as to be incapable of com-

* Willcock on the Laws of the Medical Profession, p. 145.

municating the disease, is not determined; but it is probably very considerable. Dr. Haygarth, in his work on Infectious Fevers, says, (p. 53,) "that during his long attention to this subject, not a single instance has occurred to prove that persons liable to the small-pox could associate in the same chamber with a patient in the distemper, without receiving the infection." The experience of Dr. Haygarth is supported by the observations of the profession at large, and has often been verified at St. Thomas's Hospital; for rarely has the small-pox appeared within the walls of that establishment without spreading, not only in the same, but also in the contiguous wards; and, on one occasion, even to the wards on the opposite side of the quadrangle. In a recent instance, a person caught the small-pox that lay at least thirty feet distant from the infected patient. It is impossible in any case to separate from this question the possibility of the disease having been conveyed by the students, the nurses, or by the physicians; still there are many instances in which the supposition of fomites cannot enter, as when the disease is caused by passing an infected child on the opposite side of the street, a circumstance which has often happened, and which distinctly shows that this baneful poison will spread so as to communicate the disease many feet even through the open air. The infecting distance of the variolous poison, therefore, cannot be less than from thirty to fifty feet.

Contagious.—There is no disease, perhaps, more eminently contagious than the small-pox: the variolous poison, well known to exist in combination with the serum, the pus, and the crusts of the pustules, has often been employed to produce the disease by direct inoculation, and its contagious nature in this manner has been distinctly proved. But although the poison exists in combination with the products of the pustule, still much doubt is entertained when thus combined, whether it is in any degree volatilizable, or can so impregnate the atmosphere as to communicate the disease through that medium. Dr. O'Ryan, of Lyons, placed several children around an oval table, whose least diameter was three feet, and in the centre he placed dossils of lint and of silk strongly

impregnated with variolous matter, taken from persons labouring either under the natural or the inoculated small-pox. This experiment was repeated every morning for a week, sometimes in the open[†] air, and sometimes in an apartment, without any of the children being infected, since they all remained free from disease nine months afterwards.* The dead body, however, of a small-pox patient is found to be eminently contagious and infectious; for when running into a state of rapid decomposition, it extricates an abundance of gases intimately combined with the small-pox miasma. The body of a middle-sized man, who had died of this disease, was brought into Windmill street theatre for dissection, and four gentlemen students were infected under the following circumstances:—One saw the body, but did not approach it; another was near it, but did not touch it; a third, the gentleman who has been mentioned as frequenting the small-pox hospital, and of making drawings there from the dead bodies, saw this subject, but did not touch it; while the fourth gentleman touched it with both his hands. The disease, therefore, in three of these cases, must have been imparted through the medium of the atmosphere.†

Fomites.—The propagation of the small-pox by fomites is a well-established fact, and is universally received. The Brahmin practice of inoculating for this disease by means of cotton steeped in variolous matter, and applied over the punctured part, is alone sufficient to authenticate it. It appears also that the small-pox was introduced into the Cape of Good Hope by means of fomites. A Dutch ship,‡ some of whose crew had laboured under this disease, put into that port, and the captain sent the foul linen ashore to be washed. The small-pox immediately broke out among the Hottentots employed to wash the articles, so that most of them perished: it spread up the country, and to such an extent, that the Hottentot tribes at last drew a cordon around the infected places, and shot all who attempted to pass beyond. Frank also relates a case, that occurred within his own knowledge, of

* *Dissert. sur les Fièvres.*

† *Medical Gazette*, January 31, 1829.

‡ *Mead*, vol. ii. p. 108.

the disease being communicated by fomites: a lady called one morning on a female friend, and was shown into the drawing-room, and unfortunately put on a cloak which was lying about; it belonged to her friend, who lay ill of the small-pox; she immediately threw it off on learning this event, and left the house, but was already infected, and the disease appearing at the usual time, she shortly after died.

Susceptibility exhausted.—The small-pox has the property, in common with the other exanthemata, of exhausting, after one attack, the susceptibility of the constitution to the future action of the poison. This law, however, is not without some exceptions; but the data for determining the proportionate number of persons liable to a second attack are extremely imperfect. Mr. Cross estimates it at one in three hundred, while in the late epidemic at Marseilles, Bousquet calculated it at one in one hundred. But however discordant the calculation of the chances, every author confirms the fact of an occasional liability to a second attack of small-pox in a given number of cases.

Co-existence.—The variolous poison is capable of co-existing with many other poisons; also of influencing their actions, and of being reciprocally influenced by them. Dessimarz has seen variolæ co-exist with scarlatina, and with the hooping-cough; Cruikshanks, with measles; Frank, with psora; Dimsdale, with syphilis; and Heberden, with intermittent fever, who adds, “in his omnibus, febris sponte suâ conquiescivit, et his finitis denuò reversus est.”* A case of this latter complication lately occurred in St. Thomas’s Hospital. A patient was admitted labouring under tertian fever, which was unusually intractable, and resisted quinine. At length, however, the variolæ appeared, and the fever subsided: but no sooner had the eruption run its course, than the intermittent again appeared, and was now readily cured by the usual means. Ring even mentions a case of triple disease co-existing, or of the small-pox, the measles, and the hooping-cough, all of which ran their course together.

* *Commentarii*, p. 385.

The reciprocal influence, however, of the variolous and of the vaccine poison over each other is among the most remarkable phenomena incident to morbid poisons; for the poisons being introduced into the system *together*, the one disease may precede the other, or they may co-exist. But either disease having run its course, it follows as a general law (except when the poisons have been introduced at, or nearly at, the same time) that the small-pox protects the constitution against the action of the cow-pox virus, while, in like manner, the cow-pox protects the constitution against the actions of the small-pox virus. There are many exceptions, however, to this latter law, which will be shown when treating of the vaccine disease; but still the exceptions are too few, and the small-pox, when it does occur after vaccination, too mild, to invalidate the general principle, or to render the practice of vaccination less advisable, or less practically useful.

Modes of Absorption.—The variolous poison may be introduced into the system either by a mucous membrane, as is the case when it is diffused through the atmosphere, or when a small-pox crust is thrust up the nose, as in inoculation by the Chinese method; or else it may be introduced by means of direct application of the virus to the cutis or to the cellular tissue. And out of these two different modes of introducing the poison arises one of its most remarkable laws, namely, that when absorbed by a mucous membrane, it almost always produces a disease of great malignity and of frequent fatality; while, on the contrary, when introduced by the cutaneous tissue, it produces a mild disease, and one rarely attended with any serious result; and hence the difference between the natural and the inoculated small-pox. This law is not known to be common to any other poison.

Period of latency.—The poison having been absorbed, lies for a given period in latent combination with the blood. The proof of this law is, if blood be taken from a patient labouring under the small-pox, and be injected into the veins of a dog, the animal dies; although a similar injection of healthy human blood would be attended with no incon-

venience.* But a still more satisfactory proof, perhaps, of this fact is, the occasional infection of the foetus *in utero*—a pathological phenomenon, which has taken place not only when the mother has been labouring under the disease, but also when she has been entirely free from it. In the following case the mother was infected. A woman fell ill of the small-pox. The pustules made their appearance on the 3d, and matured on the 10th or 11th of June. On the 18th, however, she was taken in labour, and delivered of a fine boy, to all appearance at the full period, but with pustules regularly distributed over the whole body, for there were thirty or forty on the face, and a proportionate number over the trunk and extremities. The pock was of a fine, distinct kind, and wanted, as was supposed, about two days of its fullest state. The child took the breast plentifully, but died in the night.†

The following case is an instance of foetal infection in which the mother was not labouring under the disease, and is given by Dr. Mead: ‡—“A certain woman, who had formerly had ‘‘the small-pox, and was now near her reckoning, attended ‘‘her husband in this distemper. She went her full time, ‘‘and was delivered of a dead child. It may be needless to ‘‘add, that she did not catch it on this occasion, but the dead ‘‘body of the infant was a horrid sight, being covered all ‘‘over with pustules.”

Dr. Jenner gives the case of a child so suddenly attacked with small-pox after birth, that he imagines it must have been infected *in utero*. A lady residing in London met, a few days previous to her confinement, a very disgusting object in the street, and whose face was covered with small-pox pustules. The smell and appearace of the poor creature affected her much; but having herself had the small-pox, she had no idea that the infant with which she was pregnant could suffer. She was shortly after put to bed, when, on the fifth day after delivery, the infant became indisposed, and on the seventh, the small-pox pustules appeared, giving a period of

* Gendrin, Hist. des Inflammations, tom. ii. p. 460.

† See case by Mr. Flinders, Mem. of Med. Society of London, vol. v. p. 351.

‡ Mead on Small-pox, cap. iv.

latency much shorter than is generally known, supposing the child to have been infected after birth.

There are some cases on record by which it appears that the child must have actually gone through the disease while yet *in utero*. Mary Spooner was inoculated by Dr. Pearson in the sixth month of her pregnancy, and went through the disease—which was severe, as she had from 1500 to 2000 pustules—safely. The child was subsequently born healthy and full grown; but, being inoculated in both arms when about eight weeks old, no infection ensued, and the child was again inoculated, but without producing the disease.* Sir William Watson even gives a case in which the cicatrices of the pock were distinctly marked at the time of birth. A woman who had formerly had the small-pox, being far advanced in pregnancy, performed the duty of a nurse to her servant, who was labouring under the small-pox. About a month after her attendance, she was brought to bed of a child that had forty scars upon its body, like those of small-pox. This child was afterwards inoculated, had some fever and local inflammation, but no eruption. Hence Dr. Watson concludes that the child must have passed through the small-pox before birth.† There are several preparations in the different anatomical museums, both of this country and on the continent, in which the foetus is covered with the small-pox. These very singular phenomena, it is apprehended, demonstrate that the variolous poison infects the blood.

The variolous poison having mingled with the blood, lies in latent combination with that fluid a period of time, which, according to another remarkable law, differs according as the poison has been introduced either by the mucous membranes or by the cutaneous tissue. For, in the natural small-pox, the more usual time is from ten to sixteen days; while in the inoculated small-pox, the period of latency is seldom more than from seven to nine days. The extremes, taking both forms of the disease, have been noted from five to twenty-three days.

The small-pox having been infrequent in this country of

* Med. Commentaries, vol. xix. p. 221. † Philosoph. Trans. vol. xlvi. p. 239.

late years, it is not ascertained at what period the poison is first generated, and ceases to be generated, or when the patient's person is or is not capable of communicating the disease. It is, however, as in the measles, probably secreted during the primary fever.

Pathology.—The period of latency terminated, the poison primarily produces fever, which lasts from two to four days, when it generally remits, and certain secondary or specific actions are set up; namely, a peculiar pustular eruption of the skin, frequently affecting the mucous membranes of the eyes, the nose, the mouth, or of the fauces. This eruption runs a given course, and when full out, or at its height, the febrile phenomena which had remitted, recur, and give rise to what is termed the secondary fever. The tertiary actions of the poison are, inflammation of the various tissues of the lungs, also affections of the urinary organs, and, lastly, of the cellular tissue of the body generally.

The law, that fever precedes the secondary or specific actions of the poison, that it subsides on the appearance of the eruption, and that it recurs on the maturation of the pock, has scarcely an exception; for although the primary fever varies greatly in intensity,—being generally severe in the natural small-pox, mild in the inoculated, and often a mere febricula in the small-pox after vaccination,—it is rarely absent. Its subsiding, also, on the appearance of the eruption has hardly an exception, unless in some severe cases of confluent small-pox; and that disease must be mild in the extreme in which secondary fever is altogether wanting.

The second great law of the small-pox, or that the secondary action of the poison occasions a peculiar eruption, has only a few very rare exceptions, giving rise to the *variolæ sine erupzione*. With these exceptions, however, the affection of the skin is uniformly present; but the affection of the mucous membranes is often wanting in mild cases, though rarely absent when the disease is of any severity. The law, also, that the poison produces many tertiary actions, as inflammation of the tissue of the lungs, of the urinary organs, or of the cellular tissue, is generally admitted; but the propor-

tionate frequency of the occurrence of these accidents is not determined.

The affection of the skin being uniformly present, while that of the mucous membranes is often wanting, makes the cutaneous eruption or pustule the great characteristic of the variolæ.

The pustule runs a given course of about eleven days, and in its progress undergoes many mutations, being at first tubercular, then vesicular, then pustular, and lastly it forms the scab or crust. These various changes form so many stadia of unequal duration : for the first, or tubercular stage, lasts from twenty-four to forty-eight hours ; the second, or vesicular stage, lasts four days ; the third, or pustular stage, occupies three days ; while the process of encrustation and of desiccation lasts three days more ; making the whole duration of the pustule ten or eleven days. The course of the eruption just described is that which is witnessed in the distinct small-pox ; but there are varieties of this disease in which the formation of the pustule is irregular, as in the confluent, the horn small-pox, and in the small-pox after vaccination.

The eruption of the distinct small-pox on the first appearance of the pustule, consists of a number of small red tubercula, or vari, about the size of a pin's head, more or less numerous, but separate and distinct from one another, and scarcely salient. On the second or third day, the second stage commences, and a small vesicle, bound down and depressed in the centre, or umbilicated, forms on the apex of each varus, and contains a clear whey-coloured fluid. On the approach of the stage of suppuration, the cuticle covering the vesicle loses its transparency, and becomes white and opaque ; while, about the fourth or fifth day of the eruption, a red areola appears around the base of each vesicle ; and shortly afterwards the central *bride* ruptures, the pustule enlarges and fills, and, becoming in some degree conical, is now said to be accumulated.*

* The appearances, says Dr. Adams, between the small-pox pustule and the cow-pox pustule are thus far similar, and can hardly be distinguished from each other. But from this time the difference is evident ; for the small-pox pustule,

From the fifth to the eighth day of the eruption, the pustule matures, when the surface becomes rough and yellow, and the cuticle at length breaking; allows a portion of the contents to ooze out. In the interval from the eighth till the eleventh day, the pustule secretes the peculiar viscid matter which concretes and forms the scab or crust, during which process it shrivels up and desiccates. This crust is detached between the eleventh and fourteenth day, leaving the cutis it covered of a dark reddish brown, a discoloration which lasts many days or weeks; while, if the pustule has so penetrated as to cause ulceration of the rete mucosum, it leaves a permanent depression, or pit, disfiguring the face, which is usually the exclusive seat of these burrowing pustules. The cicatrix which is formed on the filling up of these ulcers is usually white.*

however regular its course may have been, becomes jagged at the edges, making the outline extremely irregular, while its contents are more or less purulent. On the contrary, the form of the cow-pox pustule continues circular, and the *contents limpid*.

* The internal structure of the pustule has been examined by Bousquet, by Gendrin, and by Judd. Bousquet says that the pustule has its seat in the true skin, and that the epidermis is not thickened. On removing, however, the epidermis, which is easily detached, we discover a white, opaque, smooth surface, which is a layer of lymph deposited from its adherent surface, and on removing this "disc," the interior of the pustule is seen divided by many concentric radii into a number of divisions or cells, each filled with fluid, but not communicating. This interior arrangement Bousquet compares to a cut orange, or pomegranate, while Gendrin says it resembles that of a spice-box. The depression at the centre on the *umbilication* is occasioned by a portion of cellular tissue which binds down the cuticle, and is slow to undergo the process of *ramollissement* by which it ultimately ruptures. The description of the pustule by Mr. Judd, who appears to have examined the formation of the small pustule with great care, is, in some respects, different. For he states, that in the small-pox pustule "circles of " vessels enlarge and project from the *cutis vera*, and they secrete a thin serum, " which gradually raises a ring of the *cuticula externa* from the *rete mucosum*, " and, distending it, forms a vesicle, without, except in some violent confluent " cases, breaking up the attachment in the centre between the *cutis rete* and the " cuticle. Hence the vesicle is bound down at that spot, and hence it has a " depressed summit. The degree of inflammation suddenly increases, and a " thick coagulable lymph is then thrown out that at once consolidates, and forms " a thin flat plate like a cymbal, but with a small hole left through its centre, " from the coagulation taking place around the before-mentioned thread-like " attachment of the cuticle. Now, about (the time) the fever and inflammation

The small-pox eruption does not appear over the whole body at once ; but, like the other exanthemata, appears in three successive crops. The first crop covers the face, neck, and upper extremities ; the second, the trunk ; while the third appears on the lower extremities. There is usually an interval of several hours between each crop, and by how much later the pustules are in forming on the trunk and lower extremities, than on the face and neck, by so much the later are they in maturing, and in disappearing from those parts.

The number of pustules is very various ; sometimes not exceeding five or six, more commonly from one to three hundred, and occasionally amounting to several thousands. It has been calculated, if 10,000 pustules be counted over the body, that 2000 at least will be found on the face ; and, according to Sydenham, the danger is proportioned to the number of pustules on the face, those on the other parts of the body hardly influencing the event.

The pustule is subject to many irregularities, both as to its form and course, and which give rise to two very marked

" are again increased, called the secondary fever, and pus being secreted, it
" elevates the lately described cymbal, or plate, and causes it to divide the pustule horizontally, into an upper and lower cell, and the progressive distension
" at times breaks up the remaining attachment between the cuticle and cutis.
" The pustules become opaque ; for the pus passes through the hole in the
" plate, or septum, and blends with the lymph or serum above. The lower part
" of the pustule is completed by an extremely thickened state of the rete
" mucosum, which forms a raised lip or cup around ; and, in most instances, the
" pustule may be stripped off with the cuticle and rete, still leaving the cutis
" entire. But the cutis vera has frequently a slight depression left from ulceration at the base of the cup, and occasionally a papule of the cutis projects
" into its centre, to which the band of attachment from the cuticle still adheres.

" After the incrustation has separated, and the eruption is gone, a stain with
" a depression is commonly left in the centre of the rete mucosum, occasioned by
" a zone of red vessels remaining long distended, both in the Ethiopian and in
" the European. In the former it is black and permanent, except when the
" cutis vera has been penetrated. This fact is well shown in the Negro Argua
" (one of the hundred sons of an African chief), now at the Colosseum, in whom
" jet marks remain in the rete mucosum, and, close to them, white ones, where
" the cutis vera has been destroyed by the same eruption ; whilst in the latter
" the marks are red and transitory, unless, indeed, when ulceration has penetrated
" the cutis, in which case in them, also, the pits are white and permanent in the
" European."—*Judd, on the Venereal*, p. 122.

varieties of this disease, or to the confluent and to the horn small-pox.

The confluent small-pox differs from the distinct small-pox in the tubercula or vari being so numerous, that even on the first appearance of the eruption there is hardly any distinct separation between them. In the progress of the disease, also, although the character of the pustule is essentially the same as in the distinct small-pox, yet there are some few differences, not only in its course, but in its phenomena. The vari, for example, are smaller and more prominent, the vesicles which form on their apices appear earlier, and their diameters increase more unequally than in the distinct forms of the disease. The pustules, likewise, which are confluent, either remain flat and do not rise, or else, the cellular tissue rupturing, they form large bullæ, or bladders (*the variolæ corymbosæ*), and are not encircled with the usual red areola round their base. Their fluid contents, also, are slow to mature, and often never acquire the yellow colour and thick consistency of the milder disease; while the crusts are soft, and do not fall off till many days after the usual period, or not till the eighteenth, twentieth, or even more days. On the desiccation, however, being completed, and the crust detached, a deep scar or pit—sometimes an extensive seam—shows the destructive ulceration that has taken place beneath them.

The horn small-pox is a variety of the distinct small-pox, and is by much the mildest form of the disease. The pustule in this variety passes through the stages of vari and of vesicle, but on the fifth or sixth day of the eruption, instead of maturing, it shrivels, desiccates, and crusts, and the disease terminates three or more days earlier than the usual course, and without the occurrence of any secondary fever.

When the small-pox occurs after vaccination, the pustule runs, in the great majority of cases, the course of the horn-pock; in a few instances that of the distinct kind; and in some still rarer instances, the eruption is confluent, and passes through all irregularities incident to that kind.

Many other varieties of the small-pox have been described

by the old masters ;—Sydenham, for instance, speaks of a black small-pox ; Mead of a bloody small-pox ; Friend of a sili-quous small-pox, in which the pustule resembles a small hollow bladder, but contains no fluid. These varieties of the pustule were probably occasioned by improper treatment, or by some rare idiosyncrasy of temperament, and are consequently not mentioned by any modern writer. There is one variety, however, not unusual, which is the crystalline, or pearl pock, (*variolæ crystallinæ,*) in which the vesicle continues diaphanous, seldom matures, and has a great tendency to become confluent.

Every variety of the eruption in severe cases is often intermingled with petechiæ.

The cutis is more particularly the seat of the variolous eruption, but let the affection be at all severe, the mucous membranes of the conjunctiva, or of the palpabræ—of the nasal fossæ, or of the mouth and pharynx—are covered with it. The variolous poison consequently produces the eruption on two classes of membranes, or on the skin, and buccal and facial mucous membranes. It has been much disputed whether the eruption forms on any other of the mucous membranes, than those that have been mentioned. Cotunnius* examined upwards of forty bodies of persons that had died of the small-pox, but though he found the mouth, tongue, palate, and top of the pharynx, often covered with pustules, and in some few cases the mucous membrane of the trachea inflamed, still there was no vestige of a pustule in any other internal part, not even in the œsophagus, and only in some few cases was the mucous membrane of the trachea inflamed.

There are many authorities, however, whose observations are at variance with those of Cotunnius. Gendrin tells us, that Martinet examined a man that died on the eighth day of the eruption, in whom the rectum was covered with variolous pustules. Rostan says,† that he has seen the alimentary canal garnished with pustules similar to those of the mouth from the œsophagus to the rectum. Sir Gilbert Blane, also,

* *De Sedibus variolarum, § xxxix.*

† *Médecine Clinique, vol. ii. p. 222.*

gives two cases, which distinctly prove that the eruption occasionally attacks the mucous membrane of the intestinal canal. The first is that of a man who died of confluent small-pox at the Naval Hospital of St. Lucia, and in whom the scrotum, prepuce, and glans penis began to mortify before he died.* "The cavity of the abdomen being slit open, the intestines appeared to be perfectly sound in their outward surface, but on their being slit open from the stomach to the rectum, both included, the whole inner surface was found beset with small round ulcerated spots. The same appearance was found on the inner surface of the oesophagus. These spots were most crowded in the duodenum; and in the great intestines they were of a dark colour in the middle, like the small-pox on the surface of the skin. The villous coat of the stomach had the appearance of being much inflamed; on the inner surface of the trachea the same sort of ulcerated spots as in the intestines was found, and they were continued on the bronchia as far as their ramification could be traced. All these surfaces bore the appearance of having been in a state of inflammation. Pustules were observed in similar situations in another man, who died of the confluent small-pox at the same place about this time." Mead says, "I myself have seen subjects in which the lungs, brain, liver, and intestines, were thick beset with pustules;"† but this affirmation of Mead is not supported by any other good authority. It seems, therefore, proved, that the eruption of small-pox does occasionally attack the mucous membrane of the intestinal canal.

The mucous membrane of the trachea, it would appear, is sometimes affected with the eruption; but this appearance is often deceptive, for on opening the trachea a thick semi-purulent muciform paste, not unfrequently, is seen covering the mucous membrane, and which, from the action of the part, assumes a honeycombed appearance, and may be mistaken for a number of small-pox pustules. On removing this coating, however, the membrane beneath is found red and inflamed, but without the slightest trace of ulceration; still Rayer has

* Med. Chirurg. Trans. vol. iii. p. 426.

† On the Method of Cure in the Small-pox, cap. iii.

given a plate in which small-pox pustules are depicted in the mucous membrane of the trachea, and consequently we are bound to admit, from this circumstance, an occasional, though by no means frequent, occurrence of pustules in the mucous membrane of the trachea.

The pustules which form on the mucous membranes have not been very distinctly studied, either as to their course or phenomena: Rayer terms them rudiments of pustules. They probably, however, undergo the usual mutations of vari, of vesicle, and of pustule, but their course is shorter than when they occur on the skin; they do not crust, and they sometimes run into a state of ulceration.

The small-pox having been chiefly studied previous to any sound knowledge of the laws of morbid poisons, or of morbid anatomy, the tertiary actions of the poison are as yet imperfectly known. But about the eighth day in the distinct, and the eleventh day in the confluent small-pox, a secondary fever is established, and at the same time a new series of phenomena present themselves in a few severe cases,—as affections of the lungs, of the urinary organs, and of the cellular tissue of the body generally.

The proof that the variolous poison has a tertiary action on the lungs, is the frequent occurrence about the eighth day of hœmoptysis, or of symptoms denoting inflammation of these organs; and should these patients fall, many lesions of structure are seen. The mucous membrane, for instance, of the trachea is found often covered with a thick semi-purulent muciform matter peculiar to small-pox, (at least I have not witnessed it in any other class of subjects,) and which being removed, the subjacent tissue is seen diffusely inflamed. The substance of the lungs also is occasionally found inflamed in every degree, even to purulent infiltration. The pleura also, according to Dr. Gregory,* is peculiarly disposed to inflammation, which “comes on about the eleventh or twelfth day of the eruption, for the most part very suddenly, and proceeds rapidly to empyema.” This gentleman has seen it fatal in thirty-six hours. The pleura does not merely run into sup-

* Cyclopædia of Med. Art. Small-pox.

puration, but takes on every other form of inflammation to which it is at any time liable.

The action of the variolous poison on the urinary and genital organs is seen in the frequent occurrence of hæmaturia, and the occasional formation of abscess of the kidney, while its action on the uterus is manifest from the accident of menorrhagia in the unimpregnated, and of frequent miscarriage when the patient is in a parturient state.

That the cellular tissue of the body generally is acted upon by this poison I entertain no doubt. In two cases that I examined, only a few hours after death, the serous coat of the intestinal canal separated from the muscular and mucous coats with the slightest traction, and many feet were separated in this manner, and there seemed to be no reason why it might not have been, with equal ease, detached throughout its whole length. In one of these cases also, the finger could be thrust through the substance of the heart with the greatest facility. This affection of the cellular tissue, also, is seen in the great tendency in some cases to the formation of abscess, on the disappearance of the eruption; for twenty or thirty, or even more small abscesses, will sometimes form on a limb, or other part of the body, in most formidable succession, and which on being opened are generally found to contain a sanies, and only occasionally a healthy pus.

The different local lesions which have been mentioned, are not the only miseries that the patient may suffer, for they often give rise to sequelæ, more formidable than the preceding phenomena,—as blindness, deafness, or lameness. When, for instance, pustules form on the conjunctiva, or cornea, the inflammation may extend to the deeper seated parts, and large portions of opaque lymph are sometimes deposited between the transparent laminæ of the cornea, presenting a permanent obstacle to the transmission of light; or should ulceration of the cornea ensue, a staphylomatous protrusion of the contents of the eye may take place, ending in the total destruction of the visual organ.

The inflammation of the buccal membrane also may extend to the eustachian tube, causing suppuration of the ear, and

sometimes permanent deafness. It may spread also to the glottis, and occasioning serous effusion between the membranes of that part, the patient has been known to die suffocated by the sudden occlusion of the aperture. The inflammation of the buccal membrane also affects the salivary glands, and ptyalism is one of the most marked symptoms of the severer forms of the disease. Sometimes also it terminates in ulceration, with the loss of a portion of the nose, or caries of the jaw-bone. If the mucous membrane of the glans penis be also the seat of the pustular eruption, the frenum preputii, or if the vagina, the hymeneal membrane is sometimes destroyed.

The affection of the cellular tissue may spread to the glands of the neck or other parts, which may enlarge and run into tedious suppuration, or it may extend to the ligaments, or synovial membrane of a joint, and permanent lameness may follow. Some parts also have a tendency to mortification, as the scrotum, and boils and carbuncles are frequent in many different parts of the body. In prolonged or severe cases, also, the parts usually most pressed upon in a recumbent posture, as the back and nates, ulcerate, which prolongs, or even endangers the convalescence of the patient.

Such are the pathological phenomena, and their sequelæ, of the small-pox. Death, however, according to the experience of Jenner, Mead, Maitland, and others, has not unfrequently preceded these actions, and destroyed the patient during the primary fever, and before they could be set up.

Symptoms.—The varieties of the small-pox have been classed from the entire absence of the eruption, or from some peculiarity in its character, or else from some circumstance previous to its occurrence, as vaccination ; nosologists, therefore, admit of four species ; or,

VARIOLÆ SINE ERUPTIONE.

VARIOLÆ DISCRETÆ.

VARIOLÆ CONFLUENTES.

VARIOLÆ POST VACCINATIONEM.

The symptoms of small-pox are compounded of fever and

of the local lesions. The febrile phenomena are divided into primary and secondary fever.

The fever of small-pox is remarkable, and distinguished from all others, by the circumstance that at the end of four days, or when the eruption comes out, it entirely remits, but reappears about the end of the eighth day in the distinct, and about the eleventh day in the confluent small-pox.

The primary fever may attack suddenly, or may be preceded by some days' previous indisposition ; and in the latter case the patient is often troubled with severe muscular pains, simulating an attack of rheumatism.

The intensity of the primary fever varies from a slight febricula, to a degree of intensity that may destroy the patient, either by the violence of the reaction, or in consequence of the depressing powers of the poison. Most commonly the primary fever resembles the first stage of typhus, and cannot be distinguished from it ; but in proportion as the attack is severe, the future eruption is generally shorter and sharper. In young children, particularly, the reaction often occasions epilepsy or convulsions, which in some few cases prove fatal. On the contrary, the depressing action of the poison is sometimes so great, that, according to Sydenham, instead of fever being produced, "the patient sinks at the beginning of the disease, when the morbid matter cannot disentangle itself, and come out, by reason of the confused and irregular motion raised in the blood—bloody urine and purple spots succeeding instead, and closing the scene ; a circumstance," he adds, "that often occurs in scarlet fever and in measles."

But the fatality of the primary fever bears no proportion to that of the secondary fever, which on the eighth day in the distinct, and on the eleventh or some subsequent day in the confluent small-pox, is established in every case of any severity. The cause of the occurrence of this fever, usually termed the febris suppuratoria, has been much and ingeniously debated. According to one hypothesis, it arises out of an ultimate law of the poison, and for which no satisfactory reason can be assigned ; a second hypothesis, is that it is necessary to the maturation of the pustules ; a third, that it is caused by the

absorption of the pus contained in the pustules; and lastly, that it is a sympathetic fever, caused by inflammation of some internal organ or tissue of the body. The most probable of these theories is, perhaps, that which attributes it to an ultimate action of the poison; for suppuration more extensive often takes place without a preceding fever; neither can it arise from the absorption of pus, for it is severest in the confluent small-pox, in which the pustules oftentimes do not mature; nor can it be accounted for by sympathy, as it is frequently out of all proportion to the affection of the lungs, or of any other organ. In ordinary cases, the secondary fever is sharp, the patient restless, and sometimes delirious, but his tongue continues white. In cases of greater severity the fever assumes the characters of the second stage of typhus, and the pulse becomes rapid, the tongue brown, together with considerable restlessness and delirium. In a few cases, however, which always terminate fatally, there is no reaction; the pulse perhaps for many days does not rise above ninety, and the intellect is undisturbed; but a vehement restlessness suddenly comes on, the pulse at length becomes rapid; and these perhaps are the only symptoms that prepare us for unexpected and fatal termination of the disease.

Symptoms of the variolæ sine eruptione.—Sydenham and Frank have observed, in every epidemic, that some few persons who have not previously had the small-pox, or, according to Frank, have neither had the small-pox nor been vaccinated, are seized during the times that small-pox is raging with all the symptoms of the primary variolous fever, and which having subsided, they have afterwards been found to be unsusceptible of the disease. Sydenham states, that he has seen fatal cases of this kind attended with purple spots and bloody urine, and hence the variolæ sine eruptione.

Symptoms of the variolæ discretæ.—Of the variolæ discretæ there are two kinds or varieties, or the variolæ discretæ and the variolæ discretæ verrucosæ.*

The symptoms of the variolæ discretæ arise out of the

* So termed from the pustule shrivelling up on the eighth day, and now resembling a *wart* in hardness.

fever and of the eruption, and may be divided into three stages. The first comprises the primary fever, which commences with the disease and terminates with the eruption; the second stage commences with the eruption and terminates with the appearance of the secondary fever; the third stage commences with the secondary fever, and includes all the subsequent phenomena.

In the adult, the symptoms of the primary fever are not to be distinguished from those of the first stage of typhus; but in children there is a greater tendency to vomiting, and consequently the patient is often overwhelmed, the brain is more oppressed with drowsiness, coma, stupor, or convulsions. Sydenham says, when children, especially after dentition, are seized with convulsions during the primary fever, it is a sign the eruption will shortly appear; so that supposing the convulsions to take place over night, a kindly small-pox may be expected to be out the next morning. The duration of this stage is from two to five days, but its more common period is four days.

On the fourth day, inclusive, from the first attack of the primary fever, sometimes sooner, and but seldom later, the eruption appears, and the second stage commences. The phenomena of the second stage are as a calm succeeding to a storm; for on the appearance of the eruption the fever remits, the heat abates, the affection of the head subsides, the vomiting ceases, and the pulse returns to its natural standard; and consequently the febrile phenomena have, for the present, altogether disappeared.

The number of the pustules varies according to the severity of the case, from twenty to some thousands in the exanthemata. They appear, as is usual, in a succession of crops, or first on the face, neck, and upper extremities, then on the trunk, and lastly on the lower extremities, and run the course, and undergo the various mutations of varus, of vesicle, and of pustule, already described. About the eighth day of the disease, however, or when the eruption is fullest out over the whole body, and the pustules of the face begin to mature, the whole face, head, and neck become swollen, particularly the eye-lids, which are often so distended as

to close the eyes and to blind the patient, while the swollen parts throb and are painful when touched. The intumescence of these parts lasts three days, during which the spaces between the pustules inflame, and are of a deep red or damask rose colour, and the closer this resemblance, the milder the subsequent small-pox.

It is during this period of intumescence that the fever, which had remitted, returns, and the third stage, or that of the secondary fever, commences. This attack, in cases of ordinary intensity, is marked by a considerable increase of heat, by a frequent pulse, and by slight delirium, from which the patient is easily roused ; and if the disease be of still greater severity, by hœmaturia, hœmoptoë, and by a hard dry cough. In favourable cases the swelling of the face, the redness of the intervening spaces, and also the secondary fever, having lasted from the eighth to the eleventh day, subside, and the pustule, now fully ripe, bursts and discharges a thin yellow matter, which concretes into a crust, which falls off on the fourteenth or fifteenth day, and the disease terminates.

When, however, the symptoms assume an unfavourable aspect, and threaten a fatal termination, the face, which ought to have been intumescent on the eighth day, remains without increase of size, and the spaces, which ought to have inflamed, are pale and white. The pustules also, says Sydenham, look red, and continue elevated even after death, and the sweat which flowed fully up to this day, suddenly ceases. At this critical period the secondary fever, instead of its usual sthenic character, may assume one of two forms, or that of the second stage of typhus, with brown tongue, frequent pulse, and delirium ; or else the patient may be overwhelmed by the depressing influence of the poison, and sink almost without experiencing a reaction, the pulse being hardly increased in frequency, the heat of the body natural, and the intellect unimpaired. The first case I saw of this kind I could not help assuring the patient that his symptoms were favourable, but he shook his head, and, perhaps, from an inward feeling that his fate was sealed, affirmed that to survive was impossible, and he died a few hours afterwards.

Previously, however, to his death, there came on the indescribable restlessness, the inexplicable anxiety, some cough with sickness, a frequent desire to pass urine, and with these symptoms, the pulse becoming more rapid, he sunk after a short struggle.

In cases of any degree of severity even in the variolæ discretæ, the poison acts not only on the skin, but also on the buccal and ocular mucous membranes, and produces an eruption of the pustules on those parts. This additional affection, however, does not appear to aggravate the fever, or to occasion other inconvenience than that which arises from the local disease. The buccal eruption is usually preceded and accompanied by soreness of the throat, hoarseness, and difficulty of swallowing; but these symptoms do not exceed those of a common sore throat. The pustules also which form on the conjunctiva, or cornea, are not attended with much pain, and it is only when the swelling of the eyelids has subsided that the extent of the mischief, which sometimes takes place, is discovered.

Symptoms of the variolæ discretæ verrucosæ.—The symptoms of this variety are similar to those of the preceding disease, but they are milder; for the primary fever is little more than a febricula, while the pustules do not exceed from half a dozen to two or three hundred, and having passed through the stages of varus and of vesicle, on the eighth day, or about the usual time of maturation, they shrivel up, desiccate, and crust. This is the great characteristic of this form of the disease, which is so mild, that the primary fever, which had completely remitted, does not recur, and consequently, the third stage is almost uniformly wanting. The period of convalescence, therefore, usually commences on the eighth day of the eruption, and the disease usually terminates on the eleventh, and without the occurrence of any secondary fever.

Symptoms of the variolæ confluentes.—The confluent small-pox is described by Sydenham as beginning with symptoms similar to those of the distinct small-pox, but more violent. The first stage, or primary fever, being attended with more sickness and vomiting, with greater heat, with muscular pains more severe, with delirium more considerable, and in children

often in the evening before the eruption, by convulsions. This fever is not only more intense than in the distinct kind, but is also of shorter duration, the eruption appearing more generally on the third day, or even earlier, and by how much the sooner the pustules appear, by so much the more confluent is the disease that follows. The eruption also is often preceded by an extensive erythematous or erysipelatous inflammation, and the vari come out irregularly, or in small clusters, like the measles, and are less eminent than in the distinct pock.

When the second, or eruptive, stage is formed, the primary fever remits, but not so completely as in the distinct kind, for the pulse often continues frequent, (one hundred and ten to one hundred and twenty,) the tongue white, and even the delirium may recur in the evening. The eruption also has some remarkable characters, for the pustules, especially those of the face, do not rise; they are also more irregular and flatter in their forms, and from their greater number and contiguity run into each other and become confluent, sometimes forming bullæ as large as a hen's egg.

Another symptom also, sometimes seen in the distinct, never fails to accompany the second stage of the confluent small-pox, or *salivation*. The salivary discharge begins either with the appearance of the eruption, or within a day or two after, and is then thin and copious, resembling that of the ptyalism by mercury. About the eighth day of the eruption, however, it becomes thick, viscid, and is expectorated with difficulty, while in bad cases it either ceases for a day or two and then returns, or else disappears altogether. Children are not so liable to this salivation as the adult, but in them a vicarious diarrhoea often appears, but not constantly, neither does it occur so early in the disease. It is frequently profuse, and unless checked, often proceeds till the disease terminates.

It has been stated that on the appearance of the eruption and the commencement of the second stage, although the fever is mitigated, it does not subside, but that the affection of the head, the increased frequency of the pulse, and greater heat of the surface, continue. With these ominous symptoms then still present on the eighth day of the eruption, or eleventh of the

fever, the third stage, or secondary fever, commences, bringing with it new sources of anxiety to the physician, and of danger to the patient.

The confluent small-pox, says Sydenham, does not in the least endanger life in the first days of the illness, unless there happens a flux of blood from the urinary passages, or from the lungs; yet on the decline of the disease, or on the eleventh, fourteenth, seventeenth, or twenty-first days, the patient is often brought to such an extremity that whether he will live or die is equally precarious and uncertain. He is first endangered on the eleventh day by a high fever, attended with great restlessness, and other symptoms which ordinarily prove destructive, unless prevented by medicine. But should the patient outlive this day, the fourteenth and seventeenth are to be apprehended, for a very vehement fit of restlessness comes on every day towards evening, between the eleventh and fourteenth days, and there is the greatest difficulty in saving him.

The fatal symptoms of the third stage are the absence of the usual redness in the intermediate spaces, the non-intumescence of the face, the suppressed salivation, cough, with hœmoptoë, or hœmaturia, and great restlessness; sometimes other symptoms are added to these, as a brown tongue, delirium, petechiæ distributed in the interstices, or a black spot scarcely so big as a pin's head formed in the centre of each pock, or else a disposition to gangrene in the large vesicles; and when these symptoms are present few persons survive this terrible crisis. In some cases, however, the event is favourable, and the patient is restored, but the struggle is sharp, and the convalescence long, and in its progress an endless series of abscesses may form, inflammation of a joint may take place, and produce lameness, ulceration of the cornea, blindness; otitis, deafness, while the deeply scarred face and altered features are a lasting record of the severity of the disease, and of the great danger the patient has survived.

Symptoms of the variolæ post vaccinationem.—The symptoms of this form of the disease are in the vast majority of the cases those of the variolæ verninosæ, or the horn small-pox. In a few instances, however, the symptoms are those of the

distinct, and still more rarely those of the confluent small-pox, but whatever form they may assume, their comparative mildness is the great characteristic of the variolæ post vaccinationem.

Diagnosis.—It is not possible to distinguish the primary fever of small-pox from that incident to the other exanthemata, or from the first stage of continued fever. In the adult, however, the muscular pains are more severe, and in children there is a more frequent occurrence of convulsions.

The small-pox eruption in the first stage of the pustule is with difficulty distinguished from the vari of the chicken or swine-pock, nor is it very dissimilar to some tubercular syphiloid eruptions, but after a few hours its characteristics are so strongly marked, that it is impossible to confound it with this or any other disease.

Prognosis.—It was calculated before the introduction of the practice of vaccination, that upwards of forty thousand persons died annually in Great Britain alone of the natural small-pox, or that one in five or six of those attacked perished. At that time, however, the disease was common to boyhood and to youth, periods of life much better calculated to struggle with the effects of this poison than a more mature age. In the present day the adult is almost its only victim, and the records of the Small-pox Hospital show a much larger number of deaths in proportion to the numbers attacked, the mortality at that institution* during the last fifty years having averaged thirty per cent.; the extremes being eighteen and forty-one per cent. Since, therefore, the deaths are nearly as one in three, the prognosis in every case of natural small-pox is grave, and more grave in proportion to the age of the party. If, for instance, the patient seized be from seven to fifteen years of age, the prognosis is more favourable, but being above forty years of age he seldom recovers. Children below seven years, and infants, are in danger even when the eruption is moderate.

The more violent the previous fever, the more numerous and confluent the eruption is likely to prove.

* Art. Small-pox, Cyclopædia of Medicine.

The shorter the previous fever, and consequently the earlier the eruption appears, the more danger.

Epileptic fits or convulsions during the eruptive fever are sometimes fatal, but if the patient survives them they do not prejudice the disease. If they occur, however, while the eruption is out, death or palsy is commonly the result.

The danger of the disease is to be judged of, not so much on the whole number of the pustules, as by the number that form on the face.

The more exactly the eruption retains the form of the distinct kind, the more favourable the prognosis; the more it is confluent, the greater peril.

If in the confluent kind the eruption appear in successive crops, the danger is less than if it appear in all parts of the body simultaneously.

The more perfect the maturation of the pustule on the fourth day, and the more distinct the damask colour of the areola, the less is the danger to be apprehended.

The face not swelling on the fourth day of the eruption, when the pustules are numerous, is a symptom of great danger.

A sudden subsidence of the swelling on the seventh day of the eruption; also a sudden suppression of the salivation in the adult, or of the diarrhoea in children; a great urgency also to pass urine or the occurrence of haematuria, or of menorrhagia, especially in pregnant women, are symptoms of great danger.

On the contrary, an excessive degree of swelling of the face, head, and fauces, together with a suppression of the salivation, is highly dangerous.

The records of the Small-pox Hospital show that of those that die, one person in eight dies before the sixth day of the eruption; while one half of those that die, or nearly so, die between the seventh and eleventh days of the eruption. The symptoms which precede the death of the latter class are most commonly difficulty of breathing, haemoptoe, laryngitis, or other affection of the lungs.

Active delirium during the secondary fever, erysipelas, variolous pleurisy, sloughing sores, abscesses, whether diffuse

or circumscribed, are always dangerous. These symptoms more usually occur after the eleventh day, and of those that die, one-third fall between the eleventh and thirty-eighth days.

On the other hand, regular gentle sweats, a free discharge of urine depositing a sediment, are favourable symptoms; also if at the turn of the pock, even when the disease is confluent, the pustules, which were before flat, should mature, and the interstices pale, should acquire the damask colour before the patient generally recovers.

When the small-pox attacks a woman in a state of pregnancy, Heberden states that he has known them pass through the disease without aborting; more commonly, however, it produces miscarriage, and the child born under these circumstances seldom survives.

Treatment.—The small-pox is a highly inflammatory disease, accompanied by fever, and causing in succession every grade of inflammation to which the skin is liable. The poison also towards the termination often produces hœmoptoë, hœmaturia, menorrhagia, ophthalmia, otitis, inflammation of the different tissues of the lungs, and the blood when drawn is cupped and buffed. It is admitted that after the disease is once formed we have no antidote to the poison, and consequently can only combat it by modes of treatment. Of all the modes of treatment bleeding is the most powerful, and the question of course arises, ought we to bleed in this disease with a view to stop its progress, to check the destructive inflammation, and to prevent the many future accidents; or will bleeding according to the usual laws of poisons only the more certainly predispose the constitution to those accidents, aggravate them when they do occur, and thus lay the foundation of the most serious and fatal results. The evidence we possess on this important point is certainly not satisfactory, for it can hardly be considered as embracing the best authorities in medicine, because the practice of inoculation for more than a century, and more recently of vaccination, has rendered the number of cases of the *natural* small-pox in this country comparatively rare. Such evidence, however, as we do possess is as follows.

In the days of Sydenham the popular feeling was altogether against bleeding, and a cordial treatment and hot regimen were generally adopted. Sydenham's opinions may perhaps have wavered respecting the value of the great experiment of bleeding in the course of his long practice, but in his last treatise on this subject, 1681-82, he speaks lightly of every mode of curative treatment in mild small-pox, and admits that if the disease be not prejudiced by bad treatment, the patient will do well though unaided by medicine. In that essay also* he adds, "Nor do I find that bleeding, though it be used early, does so efficiently check the over-hasty assimilation of the variolous matter as coating;" and again, "I solemnly affirm that one of the worst cases I ever met with of the confluent small-pox, in which the patient died, happened in a young woman soon after her recovery from rheumatism, treated in the usual method by copious and repeated bleeding (p. 62); and from this instance I learned that bleeding did not contribute to keep the small-pox within its due bounds, as I had imagined."

The convulsions which sometimes come on during the primary fever, are a condition which might seem more imperatively to call for the use of the lancet than most other symptoms, yet Sydenham not only refrained from its use under these circumstances, but adopted an opposite mode of treatment, directing the child to be put to bed, a blister to be applied to the neck, and a cordial to be exhibited with a small quantity of some opiate (p. 74), adding, "I think some thousands of children have been destroyed by a frequent repetition of glysters, and of other evacuations;" and that "the small-pox which immediately succeeds comatose disorders proves very confluent, and would be heightened by bleeding and purging." Such are Sydenham's opinions of the effects of bleeding in the course of the primary fever.

Mead, on the contrary, lays it down as a rule, that blood-letting is necessary,† because "all pestilential diseases are accompanied with the highest inflammation of the blood and humours," (p. 118); and he consequently (p. 122) recommends

* Wallis Sydenham, vol. ii. p. 61.

† Vol. ii. p. 120.

large and reiterated bleeding. The consequences of this treatment may perhaps be learnt from Mead's own description of the effects of the poison. "The dissection of dead bodies shows that the infection is not confined to the external parts of the body, but seizes on the internal parts also. For I myself have seen subjects in which the lungs, brain, liver, and intestines, were thick beset with pustules." The presumption, therefore, is that since no other author mentions disease of the same amount occurring in the small-pox as that observed by Mead, that his cases must have been greatly influenced by his treatment, and it seems to follow as a necessary consequence, that bleeding was not in his hands a successful treatment.

Few physicians have adopted the practice recommended by Mead, though some have admitted the propriety of occasionally bleeding in the first stage of fever. Hoffman, for instance, says, that if the patient be young, with a full and strong pulse, and *in the habit of being bled*, these circumstances indicate bleeding on the first or second day; but should the patient be a child, a youth, or corpulent, or of a phlegmatic constitution, "a vein must not be opened, lest by taking away too much blood the matter should be detained in the body, and the eruption be prolonged for several days, and not without danger."* Cullen's opinion is not dissimilar, and perhaps not strictly accordant with itself, for if the eruptive fever be severe he recommends some blood to be taken, but if fits occur, he adds, "bleeding is hardly of any service, blistering always comes too late, and the only remedy I have found effectual is an opiate given in a large dose."† The best modern authority on the small-pox is perhaps Dr. Gregory, the present physician to the Small-pox Hospital, and his experience ‡ does not appear to be in favour of blood-letting in the first stage; "for bleeding from the arm," says this gentleman, "is not found to afford relief to the specific affection of the brain and nervous system, which ushers in a certain proportion of severe cases, and accompanies the maturative stage for the first three or four days."

* Tom. iv. pp. 154, 155.

† First Lines.

‡ Cyclopaedia of Medicine.

The evidence, therefore, that exists of the effects of bleeding in the first stage of the small-pox, seems to prove that bleeding is not the rule, although it may be the exception in the treatment of the primary fever. Nor, says Dr. Adams, had Mead's urgent prescription for bleeding and other evacuations any influence with the profession at large, for "they were soon forgotten." No case, then, is made out to induce us to believe that the early treatment of the small-pox differs from that of other diseases depending on morbid poisons. There may be exceptions to the rule of abstaining from depletion, but they must be few, since instances are rare of the small-pox proving fatal in the primary fever.

It is admitted that no sooner is the eruption out, than all the severe symptoms immediately subside, and consequently no cause exists during the second stage requiring the aid of any powerful remedy. At the commencement, however, of the third stage, or on the eighth day in the distinct, and eleventh day in the confluent small-pox, a new crisis occurs in the establishment of the febris suppuratoria, and the question is, whether in this formidable stage the symptoms are successfully combated by the practice of bleeding. Now the circumstances which mark a favourable termination of the confluent small-pox, are the symptoms assuming a sthenic character, the face swelling, and the intermediate spaces inflaming. On the contrary, the symptoms which portend an unfavourable result, are the face remaining flaccid, and the interspaces not inflaming, but remaining white and pale; or if the case has proceeded favourably till the eleventh day, with swelling and inflammation; yet should the swelling of the face vanish on that day with the salivation, the patient lies in great danger, for "although the swelling of the face ought to abate a little on this day, still it ought not to go off entirely till a day or two later, the swelling being necessary to the maturation of the pock." The symptoms, then, that assure the safety of the patient are of a sthenic character, while those which denote danger are of an asthenic character; ought we, therefore, to bleed under the latter circumstances? and perhaps on the theory of Dr. Mead, "that suppuration is brought on quicker

and better by taking some blood." The decision of this point is of infinite moment, for when "the great restlessness comes on," whether there be delirium or not, the danger is most imminent, and the patient's life may terminate in a few hours.

The directions of Sydenham for treating the case at this critical period are as follows:—"I order ten or twelve ounces "of blood to be immediately taken away from that arm which "has the fewest eruptions, and in which, therefore, the vein "may be the most commodiously opened, and an opiate to "be given in a large dose in the evening, and it is to be re- "peated morning and night from this time, and sometimes "oftener."* The exhibition of the opiate is insisted upon in other parts of his works,† as an essential part of the treatment; for he says, "It appears to me that opiates are as "much indicated in the confluent small-pox as any particular "remedy in any other disease, being a kind of *specific* here as "the bark is in intermittent;" and again,‡ "I am thoroughly "persuaded that some of my patients have died from want of "taking this medicine. On the most dangerous days, there- "fore, of the distemper, a large dose should be given morning "and evening, or oftener; and," he adds, "a small dose is of "no use;" neither, in his opinion, ought haematuria, or a violent flux of blood from the lungs, to prevent our prescribing those medicines,§ for even when those symptoms are present, he adds, "After bleeding once, give an opiate."

The more modern authorities are, perhaps, even more cautious than Sydenham, in recommending bleeding in this stage of the disease. Dr. Bateman warns us that the practice of bleeding is often injurious at this crisis, reducing the strength of the patient when the powers of life have almost failed, and consequently require every support; yet, he adds, "If the head-ache and delirium be violent, and accompanied by some intolerance of light, and other phrenitic symptoms, the detraction of blood by leeches or cupping, or even general bleeding, is demanded. Dr. Gregory adds,|| "Bleeding from the arm "is seldom advisable in secondary fever, unless accidental and

* Vol. ii. p. 364.

† Vol. ii. p. 78.

‡ Page 82.

§ Vol. ii. p. 367.

|| Cyclopædia of Med. p. 745.

"superadded symptoms, such as pleurisy or coma, occur to render it necessary. When the face continues swollen, with tendency to delirium, and a very dry skin, leeches should be applied to the temples." "In those aggravated cases accompanied with the destructive forms of ophthalmia little can be done for the patient. The loss of blood which the intensity of the symptoms indicate would be followed by great and rapid exhaustion, to save the patient's life, therefore, the eye must be sacrificed." The testimony of Rayer is also to a similar effect, (p. 405.) "The inflammatory affections of the mucous membrane which accompany the eruption of the small-pox, the ophthalmia, the coryza, laryngo-tracheitis, stomatitis, &c., all seem to require the anti-phlogistic plan. But this rule, which I at one time took for my guide, now appears to require modification. In fact, it is found that variolous affections do not give way to blood-letting, like the inflammations that are independent of the agency of miasma, and the treatment ought to be much less energetic in the former than in the latter." The evidence, then, of the best authorities is in strict accordance with the known laws of poisons, and proves that although it may be useful, in some cases, to take some blood in secondary fever, still it is at the imminent hazard of laying the patient the more strongly under the influence of the poison, and of producing those disastrous results which it is the object of the physician to prevent.

The little success that has attended bleeding at the most dangerous period of the disease induced Dr. Friend to substitute purging in its stead, but the practice has not been generally adopted. Dr. Home (p. 92) says, "When the British troops were quartered in Holland, 1747, the small-pox was epidemic. I had an opportunity of trying the purgative method in the secondary fever of the small-pox, but without success."

Mercury has also been employed, both as a purgative and as a specific, and evidently with little success. Cullen states, "It is true, mercurials have often been employed more freely than antimony, but even their salutary effects have not

" been evident, and their mischievous effects have sometimes
" appeared." Huxham also says,— " As to mercurials, verily
" some bad effects have been sometimes noted in the use of
" them, particularly petechiæ, hæmorrhages, and profuse dia-
" rhœa," (p. 133); while Fordyce adds,— " I have had opportuni-
ties frequently, in St. Thomas's Hospital, of seeing persons
" using mercurial, antimonial, and other regimens, recom-
" mended as preparatives, seized with small-pox, which were
" in no ways more favourable than in those who were not
" using these remedies." *

Neither bleeding nor purging having proved to be efficient means of treating the secondary fever, other physicians have tried tonic medicines. Macbride recommends bark; Mead, Virginian snake-root, contrayerva, assafœtida, and like substances; while Huxham says that sometimes Sydenham's method, and sometimes the treatment by bark, may be necessary. In a word, that each particular case requires a particular method, and that the duty of the physician is to adapt it rightly.

Having thus stated the opinions of some of the most competent physicians, on the effects of bleeding in the different stages of the disease, it remains to lay down the best rules for the treatment of the case throughout its whole course.

There being no antidote, at present, known to the poison of small-pox, the treatment of this disease resolves itself into a mere mitigation of such adverse symptoms as may present themselves in its progress. As the primary fever cannot, in most cases, be distinguished from the first stage of continued fever, it is a matter of prudence and of ordinary precaution to interfere with it as little as possible, and as few persons die in this stage, no case is made out for active treatment. It is seldom, indeed, that any worse symptom happens than convulsions, and in those cases we have every authority for believing that bleeding is not the rule of treatment, but does mischief, and that blisters and slight opiates are the best practice. There are, however, cases in which the cerebral symptoms run high, and where a few leeches to the temples

* Med. Chir. Trans. vol. i. p. 10.

are advisable. The minor symptoms, as vomiting, are best met by the exhibition of saline medicines, as soda water, the common effervescing draught, the sulphate of magnesia, or other medicines which may regulate the state of the bowels. The eruption having appeared, and the character of the disease manifested, as the fever now remits, no symptom is present that requires an alteration of the treatment recommended in the primary fever; and to prove with how slight remedies even severe forms of this disease may be sometimes guided to a favourable issue, the following case is an example:—A young woman was admitted into St. Thomas's hospital, labouring, as was supposed, under the symptoms of the first stage of typhus, and consequently an enema, composed of a pint of barley-water, with half an ounce of the syrup of poppies, was directed every night and morning; at the end of forty-eight hours the small-pox appeared, and was full, but distinct, over every part of the body. The enemata, nevertheless, were continued, and the patient did remarkably well, although no medicine was given.

The saline treatment recommended during the primary fever may, without impropriety, be continued through the eruptive stage; still the tendency which exists in this disease to haematuria, to menorrhagia, or to hæmoptoë, renders, perhaps, an exhibition of some mineral acid desirable. Of the mineral acids the sulphuric is the most grateful; and consequently, the infusion of roses, with such addition of the dilute sulphuric acid as may be thought necessary, together with half a drachm or a drachm of magnesiae sulphas, may be given every six or eight hours, according to the effect produced; or, should those medicines disagree, the supertartrate of potash, 3ss. to 3j. ter die, is an excellent substitute, and this treatment may be pursued throughout the whole course of the disease, except in cases when that untoward event, the secondary fever, with the fatal restlessness and anxiety, occur.

From the diversified modes of treatment that have been recommended in the secondary fever, and from the mortality being under every method nearly the same, or as one in three, it will be plain that none of them are entitled to our

confidence. I have given small quantities of wine in two cases, on account of the confluent and bullous character of the eruption. In these patients the pulse was little more than natural, the head unaffected, and nothing but the restlessness, and a conviction on their part of the impossibility of recovery, to cause alarm; still they both died a few hours afterwards. I am inclined, therefore, to think that the adoption of Sydenham's method of one small bleeding, followed by large doses of opiates, affords the most chances of recovery. Such is the general treatment of the natural small-pox.

In the course of the disease a great variety of local treatments is necessary. Gargles, for example, are extremely grateful when the buccal membrane is affected with the eruption, while the pains in the legs are best treated by warm fomentations, or by placing the legs in hot water, or in a decoction of poppy-heads of the same temperature. The sequelæ of the disease, as sloughing sores, abscesses, &c. are to be treated by poultices and the ordinary rules of surgery, but at the same time the patient must be supported by a generous diet and by tonic medicines.

In India it is usual to employ cold affusion in this disease, but it is difficult to understand with what particular object. The primary fever is sure to subside within a given time, and to shorten its course is not advisable, while after the eruption appears the heat of the body is for some days hardly greater than natural. This practice is, in many cases, not attended with any unpleasant consequences, but by no means universally so. Dr. Currie,* when pursuing his experiments of cold affusion in scarlatina, says, "One of the children supposed to be taken ill of this disease was uncommonly oppressed in the first stage, and the heat much lower than in any other case, varying from ninety-nine degrees to one hundred and two degrees; no doubt, however, being entertained of the complaint, the child was subjected to cold affusion, during the eruptive fever, in the same manner as the others. But as the disease proceeded it turned out to be the confluent small-pox, and the patient

* Reports, vol. ii. p. 57.

"died, as is usual in such cases, on the eleventh day of the "eruption." In another case also, that of a young soldier affected with primary fever, only about twenty-four hours, and whose temperature was equally low, tepid affusion, and "approaching to cold," was repeated several times, but "the disease turned out to be the confluent small-pox of the purple kind, and terminated fatally, notwithstanding every support from medicine and food." The practice of cold affusion in this disease can hardly be said to be now in use in this country, but cold or tepid ablution of the parts most exposed, or even of the whole body, is frequently had recourse to, and with results not ungrateful to the patient, though certainly not of a highly satisfactory character. Rayer even states that he has known it aggravate the symptoms of laryngo-bronchitis, which in a greater or less degree always accompanies the confluent variety.

A directly opposite mode of treatment to that of cold affusion has been sometimes practised in the last stage, the whole body being first fomented with an emollient decoction, and afterwards its whole surface enveloped in an immense cataplasm. Mr. Dunning states * that he recovered two cases of confluent small-pox by this means.

The older pathologists thought some local treatment of the pustule was beneficial, and they punctured it. The hypothesis that led to the adoption of this practice was, that by this means the absorption of the pus could be prevented, and consequently the secondary fever, and also that it would save the features and prevent pitting. The impossibility of preventing the secondary fever by this operation has long been established. The opinion of Huxham on the other point is, that "letting out (p. 150) the matter is more nice than necessary, for do it as you will, a worse cicatrix follows than when committed to nature; but here the danger supersedes even that consideration, for a mortification is sometimes brought on." Rayer has attempted to destroy the pustule in its earliest stage, and thus, by preventing maturation, to avoid the deformity of pitting; but he adds, "That on examining those

* Edinburgh Med. Surg. Journ. vol. xv.

" variolous pustules which had been touched with caution
" very shortly after this development, during life, we found
" the corion to be more corroded than in any other part of
" the body."

Dietetic and general treatment.—The diet of the patient, throughout the whole progress of the disease, should be strictly limited to milk, slops, sago, arrow-root, and ripe fruits.

The general treatment requires that the temperature of the chamber be cool, and, without exposing the patient to great changes, that it be well ventilated ; the bed-clothes also should be light. The patient's person must be kept clean, and his linen daily changed, and much attention should be paid, when the disease is long, to the state of the back and nates, in order to prevent sloughing. The scalp, likewise, should be examined, and if full of pustules, the hair should be cut off, the matting of it frequently producing troublesome abscesses.

There are no measures that can be relied on for preventing the spread of the disease, and if any susceptible person has been incautiously exposed to the infection, he ought immediately to be vaccinated ; or if vaccine matter cannot be obtained, he should be immediately inoculated, and, in either case, a mild disease will ensue.

OF THE INOCULATED SMALL-POX.

The natural small-pox is caused when the variolous poison is absorbed into the system by means of the mucous membranes. The inoculated small-pox, on the contrary, is caused when the poison, combined with the serum, or pus, of the pustule, is absorbed into the system, by means of the dermoid or cellular tissue.

Modes of Absorption.—There are many modes of practising inoculation : the poison, for instance, may be introduced by rubbing it smartly on the skin, or by inserting it with the point of a lancet under the epidermis, or, according to the method of the older practitioners, by bringing the poison into direct contact with the cellular tissue, either by making an incision through the skin, or else by passing

a seton through it, the thread of which has been steeped in the variolous matter.

The mode of inoculating, however, is not indifferent, for the subsequent phenomena are much influenced by it. When the poison, for instance, is introduced by rubbing it on the skin, as was formerly the practice in Wales, the disease is said to have been uniformly mild, and in no case to have terminated fatally. The method also of introducing it by a puncture of the epidermis, or that adopted by the Suttons, Dimsdale, and the best inoculators, commonly produced a mild disease. But the practice of placing the poison in contact with the cellular tissue is strongly objected to by Dr. Jenner ; for "I have," says he, (p. 59,) "the strongest reasons for " supposing that if either the punctures or incisions be made " so deep as to go through it, (the skin,) and wound the adi- " pose membrane, that the risk of bringing on a violent " disease is greatly increased. I have known an inoculator, " whose practice it was to cut deep enough, to use his own " expression, to see a bit of fat, and there to lodge the " poison. The great number of bad cases, independent of " inflammation and abscesses on the arms, and the fatality " that followed this practice, is almost inconceivable, and " I cannot account for it on any other principle than that of " the matter being placed in this situation, instead of the " skin. It was also the practice of another, whom I well " remember, to pinch up a small portion of the skin on the " arm of his patients, and to pass through it a needle, with a " thread attached to it, previously dipped in variolous matter. " This thread was lodged in the perforated part, and conse- " quently left in contact with the cellular membrane. This " practice was attended with the same ill success as the " former."

Although the *mode* in which the matter is introduced into the system is of moment, yet whether the serum, the pus, or the crust of the pustule be employed in inoculation ; the disease, produced in either case, is similar, but only is not so certainly produced, in proportion as the substance employed is less fluid. Baron Dimsdale, for instance, says,

(p. 27) " It appears very clearly, from the present practice of inoculation, that so soon as any moisture can be taken from the infected part of an inoculated patient, previous to the appearance of any pustules, and even previous to the eruptive fever, this moisture is capable of communicating the disease with the utmost certainty. I have taken a little clear fluid from the elevated pellicle of the incised part, even so early as the fourth day after the operation, and at other times have used matter (pus) fully digested, after the crisis, with equal success. I choose, however, in general, to take matter for infection during the fever of eruption, as I suppose it at that time to have its utmost activity."

It appears, then, that the pus and serum of the pock at every stage of the pustule possesses the property of communicating the small-pox, but the crust also has a similar power of infection. This has been proved by the Chinese, who infect their patients by means of a crust thrust up their noses. The early Constantinopolitan inoculators also sometimes availed themselves of this property of the crust, by inserting a portion of it under the epidermis; but the communication of the disease, in this way, was so uncertain that they made eight or ten punctures to insure it. The quality of the matter is not more important than its age, for whether the matter employed be taken from a patient labouring under the natural or the inoculated small-pox, or under the distinct or the confluent kind, or whether he be living or dead, the subsequent disease is indifferently mild or severe, according to the idiosyncrasy of the inoculated party.

The laws of the variolous poison, when the disease is produced by inoculation, undergo some modification, as compared with those of the natural small-pox. For the period of latency is shortened, a local disease precedes the primary fever, and the fever, as well as the specific phenomena, are generally much mitigated.

Period of Latency.--The period of latency of the natural small-pox, according to Fordyce, is usually twelve or fourteen days, while Haygarth estimates it from ten to sixteen days;

on the contrary that of the small-pox from inoculation is seldom more than eight or nine days. Dr. Bateman has calculated that out of eight hundred and ten cases inoculated, in five hundred and nineteen the fever commenced before the ninth day, and in two hundred and ninety-one, on or after the ninth day from the operation. The extreme periods are five days and twenty-three days; three cases being related in which the disease was deferred till the sixteenth, seventeenth, and twenty-third days. It is owing to this difference in the period of latency, in the two forms of small-pox, that Baron Dimsdale was enabled, with impunity, to inoculate his patient in the same room with the person from whom the matter was taken. This modification of the law, enables us also to counteract the danger which threatens a person susceptible of the small-pox, and that has been exposed to a variolated atmosphere, by immediately inoculating him; and Jenner affirms (p. 27) that the natural small-pox may be thus superseded, even when the inoculation is performed as late as the fifth day after exposure.

Symptoms.—The phenomena which result from the introduction of the variolous poison, by means of the dermis, differ, in many respects, from those that occur in the natural small-pox, and they are as follow:—On the day after the operation is performed, though it take effect, little alteration is discovered in the punctured part. On the second day, however, if the part be viewed with a lens, there generally appears an orange-coloured stain around the incision; while on the fourth or fifth day the part is hard, slightly inflamed, and itches, while a vesicle, containing serum, is formed on it. About the sixth day, some pain and stiffness is felt in the axilla, a symptom which foretels the near approach of the fever, and the favourable progress of the disease. On the seventh day the vesicle becomes more developed, and the red areola forms around its base.

The operation having now been performed seven, eight, or nine days, and the vesicle having existed four days, the ordinary symptoms of primary fever appear. This fever lasts three or four days, when the general eruption appears, called

the “secondary eruption,” the pustules coming out in three successive crops, or first on the face, neck, and upper extremities, then on the trunk, and lastly on the lower extremities. On the day of the general eruption, the “primary pustule,” says Dr. Gregory, is distended with matter, and so proceeds on its course, that it has scabbed when the secondary eruption, which runs its course in the usual manner, is only about to mature.

The most remarkable laws, however, of the inoculated small-pox, are, the singular mildness of the fever, and the diminished number of the pustules of the “secondary eruption.”

The primary fever which accompanies the inoculated small-pox, is infinitely milder than that which ushers in the natural small-pox, and the following account of it is given by Dr. Watson, from cases observed in the London Foundling Hospital.* “Of the seventy-four persons whose histories I have related,—though inoculated with variolous matter, in different states, though prepared in so different a manner, and a great many not otherwise prepared than by an abstinence from animal food,—not one of them were disordered enough, during the whole progress, to occasion the least anxiety for the event; not one of them had, from the pustules being upon the eye, or near them, their eyes closed a single day; none continued in bed an hour longer than they would have been in their best health.”

The number of pustules is subject to great variation, but, with very few exceptions, it is much less than in the natural small-pox. In some cases, not more than two or three appear; occasionally only the primary pustule is seen, but more generally the number varies from ten to two hundred, the mean being thirty or forty.

The singular mildness of the inoculated small-pox, as compared with the natural small-pox, has occasioned much speculation as to its cause. Some authors have supposed that it

* Account of experiments of the most successful method of inoculating for the small-pox, p. 20.

is a consequence of the virus having undergone some change or modification in its passage through the absorbents ; but there is no evidence in support of the assumed fact, for it is doubtful whether the absorbents are the vessels by which the poison is introduced into the system. Others again have supposed that the virus introduced under the epidermis is not absorbed, but lies in the part, producing a local disease, or pustule, which generates a milder virus, and that it is the poison of this pustule that is absorbed, and which infects the patient. This hypothesis, however, is quite contrary to all we know of the laws of absorption ; neither is there any evidence to show that the poison, subsequently generated, is of a milder character than that which originally produced the disease ; for a susceptible person, exposed to its action, would be liable to as severe a form of the disease as if contracted from the natural small-pox.

Dr. Fordyce seems to have thought a better reason might be found in the circumstance that, supposing a person to be inoculated in a different part, at different intervals, although the progress of the vesicles is dissimilar, no new fever is produced ; and he says, “ I have now so often repeated this practice, that I have no doubt but that the variolous poison has lost all its power of producing fever after the first twenty-four hours from the time it is carried into the blood-vessels.” The following instance will, perhaps, better explain Dr. Fordyce’s opinion. “ I inoculated,” he says, “ a family, consisting of three young ladies, for the small-pox. It was my custom, at that time, to make three punctures in one arm. It happened, in the eldest, that the suppuration in one of them came much forwarder than the other two ; it was perfected on the seventh day, and the fever took place. I expected great increase of fever, which was already considerable, when the other two punctures should perfect their suppuration, but was greatly surprised to find, when the first of these perfected its suppuration, that it produced no effect whatever on the fever ; neither did the second, which perfected its

"suppuration on the end of the eighth." In another case, that of a young gentleman in his seventh year—"On the third day after the first puncture I made a second; they both came forward. The fever produced by the suppuration of the first was very slight, and when the second suppurated was not at all increased." Dr. Fordyce also adds a third case of a similar description. The fact, however, which he thought he had established, of a subsequent eruption not being accompanied by fever, is by no means universal, for two cases of singular interest, as illustrating this subject, occurred in the practice of Dr. Home.* Two children were seized with the usual primary fever of small-pox, and when the eruption appeared, the fever, as usual, remitted. On the third day of the eruption, however, the fever returned, and on the fifth day again remitted, when another copious papular eruption of small-pox appeared, and covered the whole body.† The two eruptions proceeded, the one being purulent while the other was yet vesicular; but by the time the first eruption had scabbed, the second became horny and dried up, without scabbing; both eruptions, however, were followed by some secondary fever.

The preceding observations and experiments, if they do not demonstrate the cause of the mitigation of the symptoms when the variolous poison is introduced into the system by inoculation; yet, as they show in the first series of cases that the primary fever was not reproduced on the successive appearance of the pustules, and in the latter series, in which the fever was produced, still that the course of the pustules was greatly mitigated and shortened; they unquestionably afford data in explanation of the phenomena in question, infinitely more satisfactory than either of the hypotheses previously mentioned.

* Edinburgh Med. and Surg. Journ. vol. vi. p. 152.

† Dr. Willan also states, that a double fever and two successive eruptions are not unusual in the small-pox—the interval between the two eruptions being eight days. The first eruption always consists of large distinct pock, without fever; in the second the pustules are small, coherent, and sometimes confluent. See Diseases of London, p. 107.

V A R I C E L L A

is a disease consisting of a remittent fever, and of an eruption which generally runs a given course of eight to ten days. The poison exhausts the susceptibility of the patient on the first attack to its future actions.

OF THE POISON OF THE VARICELLA.

THE name of this eruption indicates that it was for a long time considered, if not variolæ themselves, at least as a disease of the same family. It is mentioned by all the early writers on small-pox under the name of chicken-pox.

Remote Cause.—The origin of this poison is unknown ; and the disease is generally of so little moment, that the predisposing causes have not been studied. The disease, however, being generated, it is contagious and infectious.

Infectious.—The evidence for the infectious nature of the varicellæ is the same as that of the exanthemata, namely, the spread of the disease in families and in schools.

Infecting Distance.—The distance to which the poison may extend when diffused through the atmosphere so as to induce the disease, is not determined ; but it is not so infectious as the poisons of small-pox, the measles, or the hooping-cough, for when it breaks out its extension is easily controlled. The infectious spread of the varicellous miasmata is, therefore, probably inconsiderable.

Contagious.—The contagious nature of this disease has been frequently proved by direct inoculation, and several cases of its communication in this manner are given by Willan.*

Fomites.—The communication of this disease by means of fomites is not distinctly proved ; but the contagious nature of the varicellæ being proved, no doubt can remain respecting this law.

Susceptibility exhausted.—This disease, as a general principle, affects the system but once during life, the susceptibility to the poison being exhausted on the first attack.

Co-exists.—The varicella may co-exist with the cow-pox, the small-pox, and perhaps with many other morbid poisons.

Modes of Absorption.—The varicella being contagious and infectious, the poison is of necessity absorbed by the cutaneous as well as the mucous tissues.

Period of Latency.—The period of the latency of the poison, in two cases inoculated by Willan,* was thirteen days in the one, and fourteen days in the other. In a third case, inoculated by Mr. Wachsel, the arm began to rise on the third day. The period of latency of the poison in the natural varicella is not determined; but it seems to be a law of eruptive diseases, that the period of latency is shorter when the poison is introduced by inoculation than when it is absorbed by the mucous membranes.

Pathology.—The period of latency passed, the poison occasions a sharp attack of primary fever, which lasts from twenty-four to seventy-two hours; then the eruption appears, and runs a course of eight or ten days. The fever is much mitigated on the appearance of the eruption, and entirely subsides with it.

The law, that the fever precedes the eruption, is so generally received, that no exception to it is to be found in any writer. The eruption has three stages, that of varus, of vesicle, and of encrustation.

After the fever has lasted from twenty-four to seventy-two hours, an eruption of a number of red papulæ, or vari, appear; these become vesicular, and in a few points pustular, on the first day. On the second day the vesicles are filled with a whitish or straw-coloured lymph; on the third and fourth days they have attained their greatest magnitude, when they burst and shrivel, except those which contain purulent fluid and have much inflammation around their base. The fifth day they begin to crust, and in four or five days more the crusts fall off, leaving for a time red spots on the skin, generally without, but sometimes with, depression. In the latter case, the “pit” is permanent, and the cicatrix generally whiter than the original tissue.

* On Vaccine Inoculation, p. 97.

The eruption consists of a series of crops. The number of the series is extremely indefinite, sometimes consisting of only two or three, while in other cases a new succession will appear every twenty-four hours, for ten or twelve days. In one case of varicella globosa, that of a child about four years old, the succession of crops continued for many weeks, till at length the child died, exhausted by the long continuance rather than the severity of the disease. The eruption usually appears first on the breast and back, and afterwards on the face and extremities, but when the number of crops is considerable, it follows no certain order.

Symptoms.—Of the varicella there are three kinds, or, the varicella lenticularis, the varicella coniformis, and the varicella globosa; the first being usually termed the swine, or hive-pox, and the two latter the chicken-pox. They differ solely in the form and magnitude of the vesicle, the varicella globosa being the largest.

The fever which accompanies this eruption is often as severe as that which precedes a mild small-pox or the measles, and it generally remits on the appearance of the eruption, and does not return.* The eruption does not give rise to any new symptom.

Diagnosis.—The varicella, of whatever kind, is distinguished from the small-pox by the shortness of the primary fever, by the rapid course of the eruption, and by the greater number and series of the crops.

Prognosis.—In all cases favourable.

The Treatment consists of abstinence from animal food, in a milk diet, and attention to the bowels.

* “In three cases,” says Willan, “the eruption was preceded by a vivid universal rash, similar to that which often attends the eruption of the small-pox.”—Diseases of London, (p.120.) “In five cases also,” he adds, (p.140,) “which occurred in one family, the eruption was attended with some swelling of the tonsils, and an appearance of ulcerated specks or pustules upon them, a circumstance I never before noticed. An attending servant, and the mother of the children had a similar enlargement of the tonsils, and slight ulceration, but without the eruption on the skin.”

ERYSIPELAS

is an inflammation of the skin, and very commonly of the cellular tissue, which for the most part is preceded and accompanied by fever. The duration of this disease is uncertain, for it may terminate in a few hours, or it may last many weeks.

OF THE POISON OF ERYSIPelas.

Erysipelas is treated of by almost every author, medical or surgical, from the time of Hippocrates downwards, but there is no circumstance connected with its history that would justify particular mention in an elementary treatise.

Remote Cause. — The remote cause of erysipelas must exist at all times in the atmosphere, or else the human body must possess the power, when acted on by certain predisposing causes, of spontaneously generating this peculiar poison. The doctrine, however, of the spontaneous generation of any poison is ill supported by argument, and not generally received, and consequently the more probable hypothesis of the remote cause of this disease is, that a poison producing erysipelas exists at all times diffused through the atmosphere, varying greatly in quantity or intensity; for, although the disease is at all times sporadic, yet in some years it is epidemic. The occasional increased prevalence of this disease has been observed by many persons. "There are 'some years,'" says Mr. Calmiel, "when among the insane 'erysipelas is almost indefinitely multiplied, so that it is 'necessary to suspend all treatment by counter-irritants, 'which form the basis of the cure of the insane; for the 'application of a seton, of a moxa, of a blister, or a slight 'blow, the opening of a vein, or the application of leeches, is 'certainly followed by erysipelatous inflammation. This 'year (1828,'" he adds, "has been remarkable in this respect, "and the infirmaries have been literally encumbered with "insane patients labouring under erysipelas." Mr. Velpeau, in the year 1831, witnessed in the Hôpital de la Pitie, a similar epidemic prevalence of this disease, for in both the medical and surgical wards, the application of leeches, a slight operation,

or even a puncture, brought on this inflammation, with all its consequences. Blache and Chomel also speak of having many times seen it epidemic, especially in the autumn of 1818, a year of excessive heat, and long drought. Erysipelas, therefore, is occasionally epidemic; it is also more frequent in summer than at any other season.

Predisposing Causes.—The predisposing causes are age, mechanical or chemical injuries, certain articles of diet, the existence of disease or any debilitating cause. The effects of age in predisposing to erysipelas are considerable; new-born children are said to be occasionally affected, but from that period till adult age it is seldom witnessed. The period of life most liable to its attacks is from twenty to forty.

If erysipelas be at all prevalent, the slightest mechanical injury will often produce the disease, as the puncture of a vein in bleeding, the bite of a leech, or a simple division of the integuments, especially of the scalp. The concussion of a part by a fall is also frequently a predisposing cause; while a patient was lately admitted into St. Thomas's Hospital who attributed the disease to long exposure to cold. Certain articles of diet likewise are exciting or predisposing causes of erysipelas, as muscles or periwinkles, many persons being attacked shortly after eating them.

The idiosyncrasy of the patient often greatly predisposes to this disease, so much so that Blache and Chomel* conceive erysipelas is in no instance the result of an external cause, for “elle suppose le concours d'une cause interne d'une indisposition particulière que nous ne connaissons pas.” Disease is also a powerful predisposing cause, and especially dropsy and fever; three cases of dropsy have been seized with erysipelas this year, (1836,) in Anne's Ward, and it is well known how dangerous it is to puncture an oedematous leg or scrotum, in consequence of the frequent occurrence of gangrenous erysipelas. One patient has recently died from erysipelas at the crisis of a fever, and the great liability of this class of

* Diet. de Med. tom. xii. p. 216.

patients to erysipelas is universally admitted. Indeed it is curious how carefully the poison selects the feeble and those broken down by disease. I do not, however, remember to have seen the phthisical patients often affected.

The spread of erysipelas has been so frequently observed, that no doubt can exist of this disease being infectious, and there is much reason also for believing it to be contagious.

Infectious.—The infectious nature of erysipelas is a doctrine of modern origin, and although not universally received,* yet the facts in support of it are so many and so irrefragable, that no doubt can be reasonably entertained of its truth. Among the many proofs of this law are the following:—in the year 1760 a person labouring under erysipelas was brought into St. Thomas's Hospital, and shortly after died. From some accident, a patient suffering from a different disease was put into the same bed, but without the usual precaution of airing the mattress, and changing the bed-clothes, and this man was also seized with erysipelas of the face, and he died. Several other patients, also, were subsequently attacked with this disease in the same ward, together with the sister, and she died. At length this disease acquired so formidable a character that a report got abroad the plague was in the hospital, which was only silenced by the physicians and surgeons contradicting it by a public advertisement. A knowledge of this fact directed the attention of the late Dr. Wells, of St. Thomas's Hospital, to the infectious nature of erysipelas, and he has related in the second volume of the Transactions for the “Improvement of Medical and Chirurgical Knowledge” several striking cases of the communication of the disease, either by infection or by direct personal contact, that fell under his own observation. These facts have been corroborated by additional instances observed by Dr. Pitcairne, also by Dr. Baillie, who, in the years 1795 and 1796, saw it spread in St. George's Hospital, and by Dr. Cullen,

* “L'opinion de la contagion de l'érysipèle ne conserve guères des partisans qu'en Angleterre ; elle ne soutient pas l'examen, et elle est tous les jours démentie par l'observation.”—*Cours de Pathologie interne*, par M. G. Andral, 460.

who had seen the like circumstance in the infirmary at Edinburgh. From that time evidence to a considerable amount has gone on accumulating, so that little doubt remains in the minds of the great majority of the profession in this country that erysipelas is both an infectious and contagious disease. In St. Thomas's Hospital, where many opportunities have presented themselves for studying the laws of this disease, there is, I believe, no physician or surgeon not fully persuaded of this fact. For since the year 1829 no less than four or five of the wards of that establishment have been cleared out, whitewashed, and painted, in order to stop the wide and fatal spread of this disease. The infectious nature of erysipelas has, indeed, on many occasions, appeared so manifest, and the danger often so imminent, that the medical officers considered it an imperative duty to recommend to the governors the necessity of sacrificing the houses on the north side of St. Thomas's Street for the purpose of procuring a more complete ventilation. This recommendation has, in all probability, led to the rebuilding of the new wards of this establishment, which combine, in so remarkable a degree, space and ventilation with warmth and comfort, so that it is hardly possible to suggest any improvement in their construction. A month, however, seldom elapses without some new and striking instance of the infectious nature of erysipelas occurring in the older parts of the building, and it is to be regretted that it has even spread this year in the new wings, for six persons in Anne's Ward have been seized with this disease subsequently to the admission of two or three erysipelatous patients into the ward. It has been said that this circumstance can be explained on the ground that erysipelas was prevalent during the last summer; but if we remember that in London erysipelas did not attack one person in five hundred, perhaps not one in a thousand, it will be plain that the chances against six persons being attacked out of twenty-six are enormous. We can, also, nearly to a certainty determine the cases which will be liable to an attack, supposing erysipelas to be introduced into a ward; for the convalescent

from fever, the swollen with dropsy, the syphilitic, and the scrofulous patient, are its surest victims. Of the six persons who have been mentioned as seized with erysipelas in Anne's Ward, one had ovarian dropsy, two ascites with albuminous urine, one was in the crisis of a dangerous fever, one had scrofulous glands of the neck, and the sixth only, one of the nurses, was a young and healthy person. It is remarkable that phthisical patients, however debilitated, are seldom liable to this disease. It is apprehended that the proof of the infectious nature of erysipelas after these facts is strictly demonstrated.

Infecting distance.—It is extremely difficult when a disease spreads both by infection and by contagion to establish each fact independently. But I have so often seen erysipelas spread in St. Thomas's Hospital from an erysipelatous patient confined to his bed, to one labouring under a different disease, also confined to his bed, that there is the strongest evidence for believing it to have been communicated through the medium of the atmosphere. In a case which recently occurred under Dr. Roots, in King's Ward, the patient lay from the infected source at least fifteen feet. But the greater space of the new wards has not been found a sufficient protection against the wide spread of this poison. The breadth of the old wards is nineteen feet, while that of the new is twenty-eight feet; still it has spread in both cases, not merely from bed to bed, but to the opposite sides of the ward, and even to patients lying three or four beds off on that side. The miasmata of typhus rarely spreads, it has been stated, from bed to bed, and, consequently, not more than from three to four feet around the patient's person; but the miasmata of erysipelas spreads from twenty to thirty feet from the infected source, and, consequently, this disease is infinitely more infectious than typhus.

Contagious.—The contagious nature of this disease has been proved by Dr. Willan, who affirms, if a person be inoculated with the fluid contained in the phlyctenæ of a genuine erysipelas, that a red, painful, diffuse swelling, analogous to that from which the fluid was derived, is produced.

Fomites.—The case given by Dr. Wells of the patient who caught erysipelas in consequence of being laid in the unchanged bed of one that had died of this disorder, and the difficulty that has been experienced in eradicating this disease from the wards of St. Thomas's Hospital, are strong proofs of this law. In the navy, also, we learn from the second volume of Mr. Travers's book on constitutional irritation, that the contagious nature of erysipelas, and consequently its communication by fomites, is so generally admitted, that it has become a debated question, whether its ravages are best limited by swabbing the decks in the usual manner, or by dry rubbing them. Among the latest evidence of the disease being communicated by fomites is that of Dr. Gibson of the Montrose Infirmary.* “Some days,” says this physician, “after the admission of a female patient into the Montrose Infirmary with abscess of the hand and caries of the bones of one finger, the patients in the two next beds to her were seized with erysipelas, and, on inquiry, it was ascertained that the suppuration of the woman's hand had been caused by an attack of erysipelas.” The patients were all now removed from that ward, which was cleaned, whitewashed, and fumigated. “Yet when the patients were again placed in that ward the disease again made its appearance, and it was found necessary to remove the whole of the patients from our little infirmary, and to take every precaution before the contagion was eradicated.”

Susceptibility not exhausted.—The patient having passed through this disease affords no security for the future; for many persons have suffered repeated attacks from erysipelas.

Co-exists.—The contagion of erysipelas is capable of co-existing with many other poisons. We continually, for instance, observe erysipelas to co-exist with primary, and also with secondary symptoms of syphilis. It was formerly not an unfrequent accompaniment of small-pox. In fever hospitals it would appear to be hardly ever absent, for at certain seasons we are told it spreads from bed to bed in those

* Dublin Hospital Reports, vol. iii.

establishments. In a case that recently terminated fatally in St. Thomas's it co-existed with severe fever.

Modes of Absorption.—It is evident, from the disease being both infectious and contagious, that the poison must be absorbed both by the mucous and by the cutaneous tissues.

Period of Latency.—The time that the poison of erysipelas may lie latent is not accurately determined. The disease has occasionally followed a few hours after exposure; but in a case now in St. Thomas's a fortnight intervened between its subsidence in one case and its reappearance in another; while in a third case the patient was constantly exposed to the contagion for three weeks before he fell ill of the disease. It is probable, therefore, that the period of latency may vary from two to fourteen days.

Pathology.—The period of latency passed, the poison generally, but not constantly, produces the phenomena of fever. The secondary or specific actions of the poison are on the skin and cellular tissue; the tertiary actions are, probably, on the membranes of the brain, and also on the mucous membrane of the alimentary canal.

The law that the poison occasions primary fever has many exceptions, especially in traumatic erysipelas from slight causes, as from leech-bites. Also, when the leg or scrotum is punctured in dropsy, fever does not precede, but forms late in the disease. Idiopathic erysipelas, however, according to Frank, is preceded in eighteen cases out of twenty by fever, while he affirms that every case is accompanied by it.

The law that the specific action of the poison is on the skin and cellular tissue, has no exception. The affection of the cellular tissue varies greatly in degree, but I do not remember to have seen any case in which it was altogether wanting. The tertiary actions of the poison on the membranes of the brain seldom occur except in erysipelas of the head, and in those cases they are rarely absent. The affection of the mucous membranes is occasional, and takes place only in a small number of cases.

The pathological phenomena which result from the action of the poison on the skin are, that the cutis is in the first

instance diffusely inflamed, and the affected part assumes either a bright scarlet or a rose-coloured tint, evanescent on pressure, but which returns on that pressure being removed. This inflammation is usually of considerable, and in some instances of great extent, occupying very commonly the whole face, head, and neck, or a considerable portion of the trunk of the body, or one or both of the lower or upper extremities. It runs a course extremely indefinite; for it may subside in a few hours, or else continue for many weeks.

The inflammation of the skin may terminate by resolution, by vesication, or by gangrene. When it terminates by resolution the rose tint gradually changes to a deeper and more venous hue, and at length fades away, leaving the skin of its natural colour, but with the texture so impaired that desquamation follows. If the inflammation terminates in vesication the cuticle is raised into vesicles of greater or less size, and even into large bullæ, containing a yellowish transparent serum or lymph: the cuticle at length ruptures, the fluid discharges, and a crust sometimes forms, which, on falling off, leaves the skin beneath either sound or superficially ulcerated. Should the termination be by gangrene, the skin becomes livid or black, its whole texture more or less disorganized, while the bullæ or phlyctenæ, which often form in these cases, are filled with a bloody sanies.

The cutis, when examined after death, is always found greatly thickened and infiltrated, but the redness, except in cases of gangrene, entirely disappears, the action of the capillary system having long survived that of the larger blood-vessels.

It is seldom that erysipelas is limited to a simple affection of the skin, for more commonly at some period of the disease the corresponding portion of the cellular tissue becomes the seat either of serous, adhesive, suppurative, or of gangrenous inflammation.

When the inflammation of the cellular tissue terminates in the effusion of serum, the quantity of fluid effused is generally so considerable, that the head, or face, or limb, is greatly, and sometimes even hideously, swollen; and when the leg is the

seat of the disease, the part is often singularly hard, tense, and unyielding. The practice of incisions, says Mr. Lawrence, enables us to see in these cases that the vessels are enlarged and more numerous, and that the cellular tissue is loaded with serum in some degree turbid and flaky. In addition to these circumstances, also, if the disease has terminated fatally, the cellular tissue has been found more easily torn than usual.

Erysipelas attended with serous inflammation of the cellular tissue usually terminates favourably, however singularly large the face or head, or however hard and tense the limb. In these cases, on the bright scarlet changing to the venous hue, absorption begins to take place, and on the skin assuming its natural colour, the effused fluid is removed, and the swelling subsides. In some instances, however, the inflammation so impairs the power of absorption that the swelling continues long after the erysipelas has disappeared; for in a case now in St. Thomas's Hospital, the tumefaction of the leg has continued for many weeks. When erysipelas follows dropsy the termination is seldom by absorption, but more commonly by gangrene or by ulceration. In ordinary cases, if erysipelas of the head, with serous effusion into the cellular tissue, terminates fatally, it is usually in consequence of the action of the poison on the membranes of the brain.

Adhesive inflammation, or the deposition of lymph into the cellular tissue, seldom takes place *per se* in erysipelas, but it often accompanies either the serous or the purulent inflammation. When the patient, for example, has died from this affection of the head, much loose and watery lymph is found in the integuments of the scalp mixed with serum. It is also probable, portions of this substance, combined with serum, must be in like manner effused in the hard and tense erysipelatous leg.

Suppurative inflammation of the cellular tissue is uniformly preceded by serous inflammation, and the result may be either the formation of an abscess, or what is more common, the pus may be infiltrated throughout a large portion of the cellular tissue, uncircumscribed by any adhesive inflammation—a

circumstance improperly considered by many pathologists as the pathonomic character of erysipelas.

The parts most liable to the formation of circumscribed abscess are the face, and more particularly the loose cellular tissue covering the orbiculus palpebrarum, and also the cheek bones. The pus found in this description of abscess is most usually of a healthy and laudable character. In all other parts of the body the abscess is diffuse, the pus being infiltrated throughout the portion of the cellular membrane corresponding to the inflamed cutaneous tissue ; and so remarkable is this tendency to infiltration, that pus has even been found diffused in the cellular tissue of the orbit of the eye. The pus secreted in the more phlegmonous forms of this abscess is of a healthy and laudable character, but when the disease is of a lower type, it is little more than a foetid sanies, and the inflammation now terminates in extensive sloughing or gangrene. The principal seat of suppurative inflammation, according to Mr. Lawrence, is the cellular tissue connecting the adipose tissue to the muscles, mortification frequently occurring in the former, while the latter is as yet only affected by vascular distention. In some cases of erysipelas the suppurative process extends to the intermuscular tissue, separating the muscles, and causing such extensive mischief as ultimately to destroy the patient ; or supposing the case to end favourably, agglutinating the parts together, and permanently impairing the motions of the affected limb.

In the event of the suppuration terminating by gangrene, a foetid pus, mixed with gangrenous portions of loose cellular tissue, escapes from the abscess as soon as the integuments are divided. This suppurating and sloughing process may go on to the extent of detaching the integuments of an entire limb, laying bare the bone, a large artery, or penetrating the intermuscular tissues and involving the aponeuroses or tendons, and sometimes destroying the interior of a joint. From this state the patient may recover, but more frequently the integuments become livid, and a fatal gangrene terminates his existence.

Gangrene, however, does not equally take place in all

parts, for it is seldom seen on the scalp, that part, according to Dupuytren, being furnished with blood-vessels, which are independent of those distributed to the pericranial surface, a circumstance which certainly does not offer any very satisfactory explanation of the law in question. The face and trunk are also seldom affected with gangrene, and, consequently, it is the extremities, especially the leg and thigh, as well as the scrotum and labia, that are its most frequent seats.

When the tertiary actions of the poison fall on the membranes of the brain, the pathological phenomena are similar to those of fever, the arachnoid being injected and serum effused into its cavity, or into the ventricles, together, perhaps, with a few points of pus or lymph deposited in the sub-arachnoid cellular tissue. The dura mater, also, sometimes exhibits marks of diffuse inflammation, and the substance of the brain more puncta cruenta than usual.

The state of the mucous membranes of the alimentary canal has been seldom observed in erysipelas. In general they are found healthy; but the following cases will show that the poison may produce either diffuse or ulcerative inflammation of those parts. A woman was brought into St. Thomas's Hospital with severe erysipelas of the head and face. She died a few hours afterwards, and on examining the body the mucous membrane of the colon was found extensively and severely inflamed, and at one part ulcerated in such a manner that the cavity of the colon communicated with the horn of the uterus, so that the fæcal matter, had she lived, must, in all probability, have passed into that organ. A boy, also, lately died in King's Ward shortly after recovering from an attack of erysipelas of the leg and thigh, and on examining him extensive ulceration of the ileum was found. In this case the lungs were tuberculated, and to this circumstance the death of the patient was owing, and, possibly, it might have influenced the state of the intestines.

Symptoms.—The most approved division of this disease is that of Willan, who divides it into four species, or into erysi-

pelas phlegmonodes, erysipelas œdematodes, erysipelas gangrenosum, and into erysipelas erraticum. This arrangement, however, is faulty, for erysipelas erraticum is not a distinct species, but merely an accident, common to all the varieties of erysipelas; neither does the term erysipelas œdematodes express what is intended by it, or an affection of the skin, accompanied by serous inflammation of the cellular tissue, but rather implies that peculiar species which succeeds to dropsy. Mr. Lawrence has proposed a different classification, drawn from the earlier nosologists, and terms erysipelas, when confined to the skin, erythema; but when the poison affects two tissues, or the skin and cellular tissue, he then adopts the term erysipelas, with the adjectives simple, œdematous, phlegmonous, &c., according to the nature or degree of inflammation. This arrangement, however, has all the faults of Willan's, without its simplicity, for if we use the term erythema when one tissue is affected, and that of erysipelas when two tissues are affected, we are appropriating two generic terms to designate the same disease, which is an error of great moment in nosology. It is extremely difficult to substitute a classification more appropriate, but there may perhaps be less of error in the following:—

**ERYSIPelas MITIOR. ERYSIPelas GRAVIOR.
ERYSIPelas GANGRENOSUM.**

The symptoms of erysipelas arise out of the fever and of the local affection.

In those cases in which the erysipelatous inflammation is preceded or accompanied by fever the attack may be sudden, or else ushered in by rigors, irregular flushings, muscular pains, accelerated pulse, white tongue, nausea, vomiting, and disordered bowels. These symptoms, when they do exist, last for some hours, perhaps till the end of the second night, or beginning of the third day, when the fever becomes continued, and shortly afterwards the cutaneous inflammation appears, but without any remission of the fever.

The fever being formed assumes the different stages, the various types, and indeed all the customary phenomena of typhus, for there is the same affection of the head, the same delirium, the same increased pulse, the same augmented temperature, the same changes of the tongue, and also the same prostration of the moral and physical powers of life.

The stages of erysipelatous fever, then, are usually, but not necessarily, three in number; the first stage is marked by a white tongue, by head-ache, oftentimes by delirium, and by a pulse varying from ninety to 110, and this stage, if the disease be mild, may constitute the whole of the fever, the tongue not passing into the brown state. More commonly, however, the fever proceeds, and about the fourth, fifth, or sixth day the tongue becomes brown and dry, the temperature falls below the natural standard, the pulse varies from 120 to 140, while the active delirium changing to a low muttering, with trembling of the limbs, or subsultus tendinum, mark the full formation of the second stage of erysipelatous fever. This stage is often extremely rapid, sometimes not lasting more than a few hours, or at most three or four days. At the end of one of those periods the third stage commences, when the tongue cleans, the delirium subsides, the pulse become slower, the temperature of the body natural, and the patient rapidly recovers, or else the disease taking an unfavourable turn, every symptom becomes aggravated, and the group of death symptoms fast gathering around the patient shortly closes the scene.

The whole duration of this fever is, in general, much shorter than in typhus, so that in idiopathic erysipelas the three stages are often concluded in the space of five, six, or seven days, and it is only in a few cases prolonged to the fourteenth or twenty-first day, unless the local inflammation should terminate in sloughing or gangrene, in which case it changes to hectic, and the disease may now last for many weeks, or even many months.

When the local inflammation precedes the fever, as in dropsy, the white tongue stage is often wanting, for in a few hours from the commencement of the erysipelas the tongue may suddenly become brown, and in this state, although the

patient sometimes recovers, yet more commonly gangrene occurs, and he is irrecoverably lost.

The *local* symptoms vary according to the part affected, the termination of the inflammation, and also according to the character and duration of the fever.

When erysipelatous inflammation affects the face* it may begin either in the skin, or else in the subjacent cellular tissue. If the cellular tissue be primarily affected, the face at the inflamed part becomes swollen, but the skin suffers no discolouration for some hours, so that it is impossible to distinguish it from an ordinary attack of swelled face. At length, however, the skin inflames, and the part is now hot, red, and painful, as well as swollen, and the disease is fully formed.

At the commencement of the disease the attack is usually partial, and, perhaps, is limited to the bridge of the nose, to one ear, the lower eye-lid, or to one cheek, but it gradually extends itself, often involving the whole of the integuments of the face, head, and neck, so that at the end of three or four days the whole head, face, and neck, often present a strangely swollen, disfigured, and, in some cases, even hideous appearance, scarcely a feature being discernible. Even in mild cases the eye-lids are greatly tumefied, and closed by an agglutinating puriform matter, while in severe cases the nose becomes greatly enlarged and imperforated from internal swelling, so that the patient is compelled to breathe through his open mouth ; the lips, also, are as tumid as the rest of his features, and he is frequently deaf from the inflammation and tumefaction extending to the auditory canal, and closing that passage.

On the fourth, the sixth, the eighth, or some later day, the bright red colour of the skin changes to a deeper hue ; the matters effused are absorbed, and desquamation taking place, the skin gradually returns to its natural colour. It is not unusual, however, for abscesses to form, particularly in the eye-lids or cheeks, and which being opened, quickly heal, and the patient is convalescent. In those cases in which the

* Chomel and Blache affirm, that spontaneous erysipelas attacks the head twenty times more frequently than any other part of the body.

disease assumes an unfavourable character the parts continue livid and swollen, and on examination after death the serum or pus effused is found deposited among the integuments. If the disease becomes erratic, desquamation is often seen going on in one direction while the inflammation is extending in another.

The trunk is occasionally the seat of erysipelatous inflammation, and in these cases the febrile affection is less violent in the first stage than in the affection of the face; but the second stage is often much longer, and of a lower type, so that the whole duration of the disease is increased, and, perhaps, the termination more constantly fatal. The inflammation attacks more frequently the lower than the upper portions of the torso, and more frequently the back than the abdomen. It has, also, a greater tendency to become erratic than similar affections of the face, and when (as it often does) it terminates in the effusion of pus among the muscles the patient seldom recovers.

The extremities are often more commonly the seat of erysipelatous inflammation than the trunk, and the lower extremities are more frequently affected than the upper. In affections of these parts the fever is likewise generally less severe than in erysipelas of the head, but the local symptoms are generally more formidable, for the degree of heat is greater, and the pain so severe, that no pressure, hardly the weight of a sheet, can be borne. The inflammation, also, often involves the lymphatic vessels, which can now be traced by white lines for many inches, as from the knee or elbow upwards, even to the inguinal and axillary glands, which sometimes enlarge and suppurate.

Diagnosis.—There are few diseases with which erysipelas can be confounded. It may be distinguished from scarlatina sine angina by the absence of papulæ and by the limited extent of the eruption; and by these circumstances it may be distinguished from the rubeola sine catarrho. It cannot be confounded with mercurial erythema, the characteristic vesiculæ being wanting. When it attacks a joint it has occasionally been for a moment mistaken for acute rheumatism, but

its tendency to spread soon dissipates this error. It is distinguished from pemphigus in the circumstance that no inflammatory redness surrounds the base of the vesicle in that disease.

Prognosis.—This disease is so influenced by treatment that it is difficult to estimate the proportion of deaths to recoveries. In one year, and in one season, and under a given mode of treatment, the deaths may, perhaps, average one in three, while under a different treatment they will not exceed one in ten, or even a much larger number.

In infants and in aged persons the disease is more fatal than in the middle periods of life.

Traumatic erysipelas of the scalp is always more dangerous than idiopathic erysipelas of the same part, on account of the greater frequency of relapses, and of the greater tendency to affections of the membranes of the brain, so that no patient can be pronounced out of danger till the wound be healed.

Erysipelas accompanied by vomiting, or by vomiting and purging, is always more critical and difficult to treat than when those symptoms are absent.

When erysipelas attacks the extremities, inflammation of the absorbents adds but little to the danger.

If suppuration of the cellular tissue of an extremity take place, the patient's recovery will depend on his age and constitutional powers. If the same result affect the trunk, the strongest constitution often sinks under the continued spread of the disease.

When erysipelas attacks an oedematous leg or scrotum, if the inflammation has destroyed the elasticity of those parts, so that they become hard and tense, the danger is great, for the affected part not unusually becomes gangrenous. In scrotal cases the inflammation sometimes extends to the testicles, and the patient then dies in horrible agony. The inflammation of the leg is hardly less dreadful, for the skin preserving its vitality long after the death of the subjacent cellular tissue is often the cause of indescribable pain.

Gangrene following idiopathic erysipelas is often recovered

from ; but gangrene supervening on dropsy is almost constantly fatal.

The supervention of erysipelas from leech bites, except in dropsical cases, is generally of little moment, although the disease may for a short time assume a formidable character.

Treatment.—Broussais states that, when with the French armies, he has seen erysipelas left to run its course uninfluenced by medicine, and the result was it made immensely rapid progress, and ended either in suppuration, in gangrene, or in fatal visceral inflammation. Some mode of treatment, therefore, is imperatively necessary to control the ravages of this too often fatal disease, and it is to be regretted that at the present moment the profession are not unanimous as to the means which should be adopted.

Erysipelas is admitted to be a highly inflammatory disease, for the affection of the cutaneous tissue is accompanied in every case by pain, heat, redness, and swelling, while that of the subjacent cellular membrane terminates either in effusion of serum, of pus, or by gangrene. On these pathological facts the whole profession are agreed, but it is divided on the mode of treatment, for one party contends that erysipelas is a disease of simple inflammation, and consequently ought, like the other phlegmasiae, to be treated by general and local bleeding ; while, on the contrary, another party adopting different views, or else having no theory to support, affirm that a long experience has shown that bleeding is often highly injurious in the treatment of erysipelas, and that an opposite or a tonic mode of treatment is much more uniformly successful. I entertain the latter opinion, and think it can be supported both by fact and by argument.

There are very few physicians from the time of Hippocrates almost to the present who have not bled in erysipelas, and, consequently, this experiment has been made on a large scale, but with results so little satisfactory that many of the warmest advocates for bleeding speak of it in very qualified terms. Sydenham, for example, bled on the first day, purged the patient on the second, and again bled him on the third day ; and if these means failed, he bled twice more, interposing a

day between each operation. Yet he adds there are cases which require a very different treatment, "for neither the " evacuations, how frequently soever repeated, nor testaceous " powders, exhibited to sweeten the blood, at all avail when a " noxious recrementitious matter lies deep in the skin, and " cannot be removed but by such remedies as strengthen the " tone of the blood, and are, consequently, proper to open " the obstruction of the pores."

Cullen is of opinion that as erysipelas is commonly attended with a full, hard pulse, as blood drawn in this disease shows the same crust upon the surface as appears in the phlegmasiæ, and, lastly, as the swelling of the eyelids frequently ends in suppuration, so from these considerations it seems doubtful if this disease be properly separated in nosology from the phlegmasiæ, and upon this conclusion he adds, "erysipelas of the " face is to be cured very much in the manner of phlegmonic " inflammations by blood-letting, cooling purgatives, and by " employing every part of the antiphlogistic regimen." But doubting, as it would appear, the truth of this doctrine, he adds this qualification,—" We have hitherto considered erysi- " pelas as, in a great measure, of a phlegmonic nature, and " agreeably to that opinion we have proposed our method of " cure. But it is probable that an erysipelas is sometimes " attended with, or is a symptom of, a putrid fever, and in " such cases the evacuations proposed above may be improper, " and the use of Peruvian bark may be necessary."

If we pass to still more modern times, we find Mr. Lawrence a strenuous advocate for bleeding, and on the same grounds with Cullen, that the disease is highly inflammatory, and cannot be separated from the phlegmasiæ. This eminent surgeon, however, admits that the facts collected by Dr. Wells, Dr. Stevenson, and Dr. Arnott, clearly prove that erysipelas of the face is contagious, and in proof of this position he even gives an instance occurring in his own practice, in which erysipelas of the face, caused by a seton in the neck, was propagated by contagion, and seems to have infected two individuals, producing erysipelas of the face in the one, and of the lower extremities in the other. He also admits that the

yellowish or rosy redness, the extensive soft swelling, the diffused suppuration and cellular sloughs, of erysipelas, present a strong contrast to the deep red and firm and circumscribed swelling, the throbbing pain and limited suppuration, of phlegmon.

These admissions on the part of Mr. Lawrence, that erysipelas is a contagious disease, and that its laws and pathology are totally different from those of simple phlegmon, make it a matter of surprise that he has not followed out the argument deducible from his premises, and which it is apprehended would have led him to have paused before he recommended and adopted large, general, or local bleedings, as the rule of treatment in the cure of this disease. This want of logical precision in his argument, also makes me doubt whether, even on his great authority, we can receive the doctrine that “the anti-phlogistic plan, including general and local bleeding, is the correct view and practice, and that the opinion of those who take an opposite view is completely erroneous, and the treatment founded on it not only inapplicable, but injurious.” If, however, we look to the facts advanced by Mr. Lawrence in support of his position, that erysipelas, though a contagious disease, is, nevertheless, to be classed with the phlegmasiæ, and to be treated by bleeding, we shall find that they are few in number, and neither strongly conclusive or eminently successful; for he gives only seven cases of idiopathic erysipelas, and in one he had ultimately recourse to bark, while another ran on from April to August. He also gives seven cases of traumatic erysipelas, which he likewise treated with copious general and local bleeding, but with so little success, that he was in all of them driven to the unhappy necessity of making his long and large incisions, on account of suppuration taking place.

It appears, then, that the facts are not more favourable to Mr. Lawrence's views than the argument, and our confidence in bleeding will be still more considerably shaken if we turn to pages 66, 67, where he tells us that when the inflammation is very fully established, perseverance in direct depletion is of little avail in checking its further progress, for the

inflammation will now pursue its course both in the cellular tissue and in the skin; and also, that in spite of bleeding, whether general or local, suppuration and sloughing speedily supervene, and these destructive processes soon extend over a large portion of a limb. Indeed, he adds, "I have found that venesection exerts but little influence over inflammation of the cellular tissue;" we must, therefore, as he tells us, if we bleed in erysipelas, bleed speedily, and while the disease is as yet incipient, a rule which, if adopted, would, according to my experience, reduce very large odds to a chance of little more than three or four to one in favour of the recovery of the patient. It seems to me, therefore, that there is great looseness in Mr. Lawrence's reasoning on the subject of erysipelas, and that his practice is not supported by any sufficient number of facts.

In France, also, Dupuytren held nearly the same sentiments with Mr. Lawrence, in regard to erysipelas. This distinguished person was firm in his belief that erysipelas is a disease of simple inflammation, and consequently he employed the most energetic bleeding in order to subdue it. He gives five cases. The first is that of a man who fell upon his knee, and erysipelas of that part, which extended over the leg and thigh, followed. Under these circumstances he was bled generally and locally, to a large amount, and the result was that the femoral aponeurosis was laid bare, the tibia and patella exposed, while the entire leg was denuded of the skin and cellular tissue. What, says Dupuytren, with admirable *naïveté*, could nature do against such devastation? Art equally fails, and the youngest and best constitutioned person must infallibly sink under such a disease.

The second case was that of a person who received a contusion on the left leg, and erysipelas followed. The patient was bled, and repeatedly leeched; but notwithstanding the disease continued to spread.

The third case was a woman whose menses being suppressed, it was thought advisable to bleed her in the foot; erysipelas was the consequence, and leeches having in vain been several times applied, Dupuytren saw her. The treat-

ment adopted by him was general bleeding, seventy leeches, together with incision after incision. These means, however, were so ineffectual, that the tendons of the exterior muscles sloughed, and the disease assumed so formidable a character, that Dupuytren debated on the propriety of amputating the limb, and was only prevented from performing the operation from a conviction that the state of the patient's health rendered it impossible she could survive so great an injury. Happily, this woman, left to nature, at length so far recovered as to be discharged in the middle of the fourth month, being able to make some *faibles mouvements* with the affected limb. But on making some slight exertion the cicatrix was shortly afterwards ruptured, so that she again returned to the hospital. The fifth patient died.

The treatment by bleeding, however warmly advocated, has been opposed by a large body of the profession, who affirm that, according to their experience, it has proved highly injurious. Lepelletier* says, that in France the greater number of practitioners are agreed on the danger of bleeding in the majority of cases of erysipelas, and that this operation ought not to be had recourse to, but when the inflammation *marche franchement*, the patient plethoric, the fever violent, and the pulse full.† Blache and Chomel say, experience has proved that general bleeding has often no other effect than to blanch the eruption, *pâlir l'éruption*, without notably abridging its duration. Bauquier,‡ in his account of the practice of the Hospitals de la Pitie et de Cochin, says, that M. Bally|| abstained altogether from bleeding, or the application of leeches, in his treatment of erysipelas of the face, for he speaks of it “comme propres à agraver les symptômes, à

* *Traité de l'Erysipèle*, p. 69.

† Lepelletier says, p. 160, bleeding ought to be employed with reserve in phlegmonous erysipelas, as it is rarely capable of stopping it, while it notably augments the gravity of the case in the latter stages.

‡ *Annuaire Medico-chirurgicale*. 1827, p. 279.

|| Bally limited himself to the use *de la limonade gommeuse*, and to sinapisms to the extremities, and by this treatment he found his patients quickly recovered, while those submitted to an antiphlogistic treatment, as bleeding or purging, experienced either grave accidents or died. p. 280.

faciliter l'invasion du délire, à lui donner de l'intensité et à prolonger la maladie." Bauquier also states, that the only cases of erysipelas, according to his observation, attended with danger, were those in which the antiphlogistic treatment had been employed.

Among the physicians of this country, Dr. Fordyce says, " Bleeding and other evacuants I have always found hurtful.* " Peruvian bark is the most powerful remedy : it should be exhibited in substance, and in as great a quantity as the stomach will bear." Dr. Wells entirely adopted the practice of Dr. Fordyce. Dr. Heberden says, " This disease is for the most part malignant rather than inflammatory, and neither requires nor will bear purging and venesectio. I have seen patients rendered much worse by this practice." Mr. Pearson says, cases very rarely occur in large towns where bleeding is at all admissible, and a repetition of the operation will very seldom be necessary ;† and he objects to the loss of blood even in erysipelas consequent on wounds of the head, merely admitting that the abstraction of a few ounces by cupping may be allowed in the early stage, or that leeches may be applied if the brain is likely to be affected. Mr. Bromfield also states, that during two years erysipelas was epidemic in London, the antiphlogistical treatment was generally fatal, while cordials were most efficacious.

Dr. Butter also, in his remarks on irritative fever (p. 248), regards venesectio as absolutely injurious in erysipelas, for of fifteen severe cases that occurred in Plymouth Dock-yard, twelve died, while two out of the three that recovered were not bled. Willan's authority is hardly more favourable to bleeding ; for after stating that all ancient writers on medicine, except Galen, recommend bleeding, he adds, " This practice must be evidently improper in the three forms of erysipelas last described, and even in the erysipelas phlegmonodes it does not always appear necessary." " When the blood drawn is sизy, practitioners are often induced to bleed a second time, but we generally find in London that repeated blood-letting aggravates the symptoms, and protracts the disease.

* Med. Chirurg. Trans. vol. i. p. 293.

† Principles of Surgery, p. 211.

" In a comatose or apoplectic state, the application of leeches, " or cupping-glasses to the nape of the neck, may be advisable."

Such is a short statement of the contending evidence on the important point of bleeding or of not bleeding in erysipelas; and upon a review of the different facts and arguments, it certainly does appear that those writers who, like Cullen and Lawrence, admit the contagious nature of erysipelas, and yet contend that it is a disease of simple inflammation, and ought not to be separated from the phlegmasiæ, are in error as far as regards the great principle which should govern us in the classification of disease. Admitting, also, the contagious nature of erysipelas, if bleeding be the rule of treatment, they are bound to show that the *methodus medendi* of the phlegmasiæ, and of diseases originating in morbid poisons, are entirely similar; or if dissimilar, that the treatment of erysipelas is an exception to the general law of contagious disease. It is apprehended, however, that the first position is altogether untenable, while the facts at present adduced are too few, and of too questionable a nature, to establish the latter. Mr. Lawrence, to strengthen his case, has attempted to distinguish between the different forms of erysipelas, and to apply a graduated scale of antiphlogistic treatment. But as it appears from what has been stated, that the early symptoms of erysipelas, whatever form the disease may ultimately assume, are essentially the same, so that the most discriminating observer cannot predict the future consequence, it will be plain that the application of this rule must be absolutely impossible. For, if the disease is "to be cut short," "to be prevented from spreading beyond its original seat," the skin; also, "that bleeding is of no use after the cellular tissue is once inflamed," as the disease will now pursue its course "in spite of bleeding;" it will be evident that, in order to bleed in the right case, we must bleed in all cases of idiopathic erysipelas, and, perhaps, to the same extravagant amount in the asthenic as in the sthenic individual.

The weight of argument, then, appears to be against those who advocate the principle of bleeding, their conclusion being, it is apprehended, in direct contradiction to their premises;

while, if we are to determine the question at issue by the weight of authority, the names of Fordyce, of Wells, of Hunter, and of Willan, are almost sufficient to determine any medical fact, for those persons are certainly unequalled for patient observation, for boldness in deviating from received practice, and for candour in estimating results. As far as my own opinion may weigh on this important subject, it certainly is entirely opposed to the practice of bleeding. During a period of three or four years, a large number of cases of erysipelas were treated in St. Thomas's Hospital by large bleedings; and the consequence was, a great mortality among that class of patients, and the production of a disease so contagious, that it was difficult to eradicate it from the wards. It is not pretended but many patients will recover, some, perhaps, in consequence of, and others probably in spite of, bleeding; but to determine the particular case in which bleeding is essentially necessary to the safety of the patient, has hitherto baffled all ordinary diagnosis.

As an instance of the difficulty of forming a correct diagnosis in these cases, two patients were selected whose symptoms were as nearly the same as possible; they were both bled, and the one was benefited, and the other rendered much worse. Traumatic wounds of the scalp, followed by erysipelas, from the inflammation generally extending to the membranes of the brain, have appeared to be that form of the disease most likely to be benefited by bleeding. An exceedingly promising case for this practice occurred in a young man that had been wounded in the scalp, by a blow from a policeman's staff. This patient was bled three times, a day being interposed between each bleeding, and each time to the amount of 3xvj.; but after each loss of blood, all the unfavourable symptoms increased, delirium supervened, and he died apparently in a much shorter time than if the disease had been left to itself. I therefore rarely have recourse either to general or local bleeding in erysipelas, having, as I conceive, witnessed much mischief result from it, having lost several patients by adopting it, and having seen but little benefit produced by it. A long experience has confirmed me in this view of the disease, and I feel satisfied

that bleeding is not the rule of treatment in erysipelas, but the exception, and the having recourse to it in any particular case must depend on the judgment of the practitioner, and involves a great responsibility.

A large number of physicians, having no theory to support, and apparently influenced only by the results of a long practical experience, have been induced to adopt a reverse mode of treatment to bleeding, or that by bark or other tonic remedies. Dr. Fordyce, perhaps, is the first that recommended bark in erysipelas ; and he states,* " Peruvian bark is the " most powerful remedy ; it should be exhibited in substance " in as great quantity as the stomach can bear." Mr. John Hunter also placed great reliance on bark. Dr. Wells constantly used it. The late Dr. Powell entertained an opinion that bark was a specific in erysipelas, and he constantly prescribed it, whatever the symptoms, in $\frac{3}{4}$ j. doses every four or six hours ; and if the patient was purged, he frequently added opium to it ; and his practice was almost uniformly successful. The late Dr. Haworth also adopted the same treatment ; but on one occasion deviating from it, and prescribing antimony, extensive ulceration with sloughing took place in the affected arm, and this was the only serious case I remember to have seen in his practice. Now, if to these names we add those of Garthshore and of Willan, it is clear that a large amount of good must be effected by adopting a tonic treatment.

My own experience leads me to join with these physicians, and to adopt a tonic mode of treatment as the great rule in idiopathic erysipelas. But I have for some years abandoned the use of bark, for I observed when the patient was treated by bark, he did not become convalescent till his tongue had become brown, and, consequently, not until he had sunk into a completely typhoid state, that lowest point of depression consistent with life, and at which the poison either ceases to be generated, or else the system is no longer sensible to its further action. At this point, however, but not before, the bark appeared to me to take up the disease ; and the patient, in a very large majority of cases, recovered.

* Med. Chirurg. Trans. vol. i. p. 293.

It was plain from this circumstance that bark was not a specific in erysipelas, but merely a powerful tonic, and, therefore, it became a subject of much interest to determine whether any variation of this treatment could be discovered by which the brown tongue stage might be prevented, and the hazard of the disease lessened. In attempting this object, I was led to prescribe in several cases, as long as the tongue continued white, the liquor ammoniæ acetatis, and such medicines as regulate the bowels, and to delay the exhibition of the bark until the tongue had of itself become brown. This modification was, perhaps, a slight improvement, and something appeared to me to be gained. But when this practice is adopted, it is necessary to see the patient daily; for it sometimes happened, if the intervals were longer, that he rapidly sunk, and much mischief ensued. I have, therefore, after a considerable number of experiments, been led to the conviction that a treatment by wine is superior to that of bark, or to any modification of that treatment. The mode, then, in which I am in the habit of treating idiopathic erysipelas, whatever may be the part affected, or with whatever symptoms it may be accompanied, is as follows:—the patient is put on a milk diet, the bowels gently opened, and from four to six ounces of port wine, together with sago, allowed daily. This mode of treatment it is seldom necessary to vary throughout the whole course of the disease; for the delirium, if present, is generally tranquillized; if absent, prevented; the tongue more rarely becomes brown, or only continues so for a few hours; while the local disease seldom passes into suppuration or gangrene. In a word, all the symptoms are mitigated, and the course of the disease shortened. I have pursued this system for several years, and I hardly remember a case in which it has not been successful.

On comparing the effects of the treatment by wine with that by bark, the wine is much more easy of digestion, its effects are more transient, it has less tendency to affect the head or to disorder the bowels than quinine, and it likewise in no case reduces the patient to so low a state, so that there does not exist the same necessity for supporting him. The quantity

of wine may appear small; but as it is prescribed on the very first appearance of the disease, it is usually sufficient. Still in a very few instances it may be necessary to increase it. This was the case with a young woman admitted only a few weeks ago into St. Thomas's Hospital, with extensive inflammation of the face and scalp. Six ounces of wine daily were prescribed for this patient, and in this dose the disease showed a tendency to spread down the neck and shoulders; but on the wine being increased to eight ounces, the disease was at once arrested, desquamation ensued, and the patient rapidly recovered. A patient in Lazarus's Ward was some considerable time ago seized with erysipelas of the face and scalp, and to such a degree, that, taking it altogether, the countenance and head were more remarkably enlarged, swollen, and hideously deformed, than I recollect to have ever witnessed; they were literally as big as a bushel. Five grains of the sulphate of quinine were ordered for this patient every four hours, together with eight ounces of wine daily, and under this treatment he recovered. About two years after, however, he was brought into the hospital, with a similar attack of erysipelas, but, as was supposed, of much milder character. Under these circumstances quinine alone was prescribed, but to our surprise he rapidly sunk and died. Two cases of erysipelas, not less instructive, were recently treated in St. Thomas's. The patients were both stout, healthy young women, and nearly of the same age; the seat of the disease also was the same, or the head and face, and they suffered equally from delirium, so that the difference between them, if any, was scarcely distinguishable. For the one, four ounces of wine were prescribed on the Saturday, and there appeared no sufficient reason to increase the quantity on the Monday; but between Monday and Thursday, the day on which I next saw her, she had so sank that it was impossible to recover her. The other case was admitted about three days later, and in the first instance only four ounces of wine were prescribed for her, but, warned by the fate of the former person, although she was highly delirious, I immediately increased the wine to eight ounces, and added also two grains

of quinine every six hours; under this treatment she rapidly recovered, so much so, that in four or five days it was thought practicable to reduce the wine to its original quantity, or to four ounces. But on this reduction being made, the disease immediately returned, and it was once more necessary to increase it to eight ounces, and the patient now rapidly recovered.

It has been imagined that when an extremity, as the leg, was hard, swollen, and painful, that the mode of treatment by wine was inapplicable, and that the only resource was in incisions: the following cases, however, will show a different result.

An exceedingly large and corpulent lady, after a short attack of rigors, was seized with erysipelas of the leg, extending from the foot to the groin, and the whole limb was hard, tense, and incompressible; her tongue was white, she was slightly delirious at night, and her pulse was 120. Six ounces of wine were ordered daily, and the disease by this means was checked, and the pulse reduced to 110. But at the end of four days the case was still formidable, when two grains of quinine were prescribed, in addition to the wine, every six hours. On the following morning the fever had abated; the pulse had sunk to ninety; and in a few days this patient recovered without suppuration or other local mischief taking place in the leg.

A middle-aged man was admitted into St. Thomas's Hospital, who, after a sharp attack of rigors, was seized with erysipelas of the left leg and thigh, so that, as in the former case, the limb was hard, tense, and incompressible, while considerable vesications had formed on the thigh. This case was exceedingly formidable, and pronounced by a high authority to be fit for incisions. The pulse was 120, the tongue brown and dry, and the stools black and offensive. Six ounces of wine, with sago, were ordered for this man, and in about five days the tongue had become white, the pulse was reduced to ninety, the fever had abated, the local tension greatly reduced, and the patient was from this moment convalescent.

The evidence adduced is, perhaps, sufficient to prove that

erysipelas ought not to be classed among the phlegmasiæ, and also that the tonic mode of treatment has the support of a much larger body of the profession than bleeding. It is to be regretted that the treatment by wine leaves much to be desired ; but the exceptions to be provided for are much less numerous than when depletion is adopted. Among these exceptions is a small class of cases to which the wine treatment is only inapplicable, because it is not retained on the stomach ; or those in which there is excessive vomiting, or vomiting and purging. These cases are not common, but, when they do occur, are often fatal ; and whether leeches or general bleeding might be more advantageously employed, I have not sufficient experience to determine.

Many other modes of treatment have been recommended, and especially that by Stoll among physicians, and by Des-sault among surgeons, or by tartarised antimony. There are cases in which this treatment has been successful, there can be no doubt ; but it has been seen that vomiting is among the most dangerous symptoms of the disease, and when it occurs by no means relieves the patient. It seems, therefore, impossible to believe that it is a mode of treatment generally applicable ; and, indeed, so little is it esteemed, that it is seldom employed in the present day ; and those who have employed it, by no means speak in commendation of it. Thus, Chomel and Blache state that experience has shown that emetics and purgatives have but a very equivocal influence over erysipelas ; while Lepelletier observes (p. 115), emetics and purgatives have always appeared to do mischief in many forms of erysipelas, especially in those complicated with gastro-intestinal irritation, and in those in which the head is affected, and the patient strong and powerful, with considerable fever and tendency to cerebral affection.

When erysipelas succeeds to leech-bites, the disease, however formidable in appearance, yet in general yields to the *methode expectante*, or to an abstinence from animal food, and to attention to the bowels. When erysipelas, however, succeeds to dropsy from the same cause, or from the wound of the lancet, gangrene generally ensues, nor does

the disease appear to be favourably influenced by any treatment.

Local Treatment.—The general treatment is, by most practitioners, accompanied by some local treatment, as blisters, poultices, fomentations, cold lotions, the application of mercurial ointment, punctures by the lancet, leeches, and lastly, by large incisions through the integuments down to the fascia. The value, however, of any or all of these auxiliaries in idiopathic erysipelas is extremely doubtful.

The practice of applying blisters is supposed by Lepelletier to be of Italian origin, and to have been introduced towards the close of the seventeenth century. In the present day blisters have few advocates, although their use is sanctioned by the high authority of Dupuytren, and on the hypothesis, that by this means we convert an erysipelatous into a sthenic inflammation. He limits, however, their use to mild cases, and applies them only when the tongue is moist and slightly red, the skin moderately tense, and the general reaction trifling. On the contrary, he affirms, if the skin be hot and dry, red and tense with fever, and a dry tongue, both blisters and emetics do harm.* There are many dissentients, however, to the application of blisters under the circumstances recommended by Dupuytren, and, indeed, it is difficult to understand their value when applied to cases of a slight nature. Thus Biett, Cazenove, and Schedel, conceive that blisters ought not to be employed except to fix erratic erysipelas, or to recall this affection when it has suddenly died away. Olivet considers them not applicable under any circumstances, being not safe either in erysipelas of the head, chest, or abdomen, for he has seen a blister applied to the neck cause delirium and death, while in another erysipelatous patient a blister to the chest appeared to have caused his death the following day. Rayer also disapproves the use of blisters, and says, (p. 134,) "These affections are reflections of a lesion deeper seated and more serious than a blister can remove." Mr. Lawrence also adds, this method always causes severe pain,

* De la Erysipèle, par Fr. Olivet, p. 3.

" and usually leads to the formation of an abscess, and sometimes causes mortification of the part to which the blister is applied,—must be employed with caution, and only in cases where the extension of the inflammation might lead to serious consequences."—P. 66.

Cold or evaporating lotions applied constantly to the inflamed part are, at all times, exceedingly grateful to the patient, and for a time diminish the pain and lower the temperature. Cullen, however, entertained a doubt, whether they do not greatly favour the formation of pus, and even lead to a more serious result. "The narcotic, refrigerant, and astringent applications are suspected of disposing to gangrene. Spirituous applications seem to increase the inflammation, and all oily and watery applications seem to occasion its spreading." "The application," he adds, "which seems most safe, and which is now commonly employed, is that of a dry mealy powder frequently sprinkled on the inflamed part."* The following are Mr. Lawrence's directions: (p. 66.) "In the commencement, and before the inflammation is fully developed, cold applications are very agreeable by lessening the sharp burning heat of the skin; warm applications, more especially fomentations, are very soothing when the inflammation is developed: to derive full benefit from them they should be steadily used for hours together, and the part may be covered with a warm bread-and-water poultice in the intervals of fomenting." In the practice of St. Thomas's Hospital cold lotions are very generally employed, and it has appeared to me as a consequence, that suppuration has much more frequently followed than used to be the case formerly in St. Bartholomew's Hospital, where those applications were rarely had recourse to in the patients treated by the physicians. I have little experience of the use of poultices and warm applications, having seldom employed them early in the disease, from a conviction of their tendency to induce suppuration.

Many physicians have tried anointing the inflamed part with mercurial ointment, but are not agreed on its efficacy.

* Practice of Physic, vol. i. p. 378.

Ricord states as the result of his experiments begun in the year 1828,* "That the double mercurial ointment is the topical remedy which has given me prompt and happy results. Out of 116 cases I have lost but two, and in one of them the erysipelas was caused by a caries of the bones of the cranium penetrating the orbit; while the other died in consequence of an operation in which three-fourths of the lower jaw, the whole of the lip, and some of the soft parts of the neck, had been removed." His method is, when the erysipelas is without complication, to cover the whole inflamed surface with a layer of double mercurial ointment, so thick as to mask the colour of the inflamed skin; and so extensive, as to project beyond the edges. The dose, therefore, is in proportion to the surface affected, and is to be renewed every twenty-four hours, or oftener if accidentally removed. The result he states is, that the patient is soothed, the pain abates, and at the end of twenty-four or forty-eight hours, the tumefaction, heat, and redness disappear, and the part becomes wrinkled. At this point he directs the ointment to be wiped off, and not again applied, for in such case diarrhoea or salivation follow. He also prohibits the application of the ointment to the sound skin, for then it is absorbed, but does not prevent the further progress of the disease; "se conduisant ici comme il le fait dans une foule de cas d'affections syphilitiques, guérissant le symptôme une fois dévelopé, mais n'en prévenant pas le développement." He states also that phlegmon is rare when the mercurial ointment is employed, and phlyctenæ still more so; that the mean duration of the disease when thus treated is from four to six days (but more patients are cured between the second and fourth day than after the seventh); and, as a last result, that this mode of treatment is so superior to any other that he has employed, "that it is a matter of conscience to recommend it." It is to be regretted that this sanguine promise has not been realized when the experiment has been repeated; for Rayer states, in erysipelas of the face,—"I have many times anointed one side of the face with axonge, and the

* See Lepelletier, p. 118.

" other with mercurial ointment ; frequently also have I applied mercurial ointment, or simple ointment, to one side of the face, while the other has been left without any application whatever, but the disease has not appeared to have decreased more on one side than the other." (P. 161.) And, again, " Such topical medicamentation has much less effect than those who have recommended it imagine, for, in fact, it does no more than diminish the heat, dryness, and tension of the skin."

The application of leeches to the inflamed part has often been had recourse to ; but they are not strongly recommended by any authority, and the cases reported by those who have most used them do not encourage us to repeat the practice. My own opinion is, that I have often seen much mischief follow their use, and seldom any benefit ; indeed, the bite of the leech being well known to be frequently followed by erysipelatous inflammation, it has been much disputed whether their application is, under any circumstances, advisable. Willan, for example, observes, that it is not safe to put either leeches or blisters near the diseased surface. Dr. Thomson also, in his Lectures on Inflammation, (p. 186,) is of opinion, " that punctures or leech-bites in inflamed cutaneous texture are liable to aggravate the inflammation already existing, or even to bring on a state of mortification." Mr. Lawrence, on the contrary, observes, " that although leeches, when applied to the sound skin in some individuals, produce an effect analogous to erysipelas, they exert no similar influence over the inflamed skin, to which they may be applied freely and safely. The apprehension expressed by Willan, by Thomson, and others, is groundless."

Dr. Dobson has recommended, instead of leeches, the practice of making a number of punctures, with the point of a lancet, over the inflamed part, in every case of erysipelas ; the size of the puncture to be from 2-10ths to 4-10ths of an inch, and the number to vary from ten to fifty ; the operation to be repeated twice, and in bad cases three or four times, in the twenty-four hours. " This practice," he adds, " has been resorted to by me in several hundred cases,* having

* Med. Chirurg. Trans. vol. xiv. p. 207.

" adopted it more than a dozen years ago. I have never
" seen any bad consequences result from it. The quan-
" tity of fluid—for it is not blood alone, but blood and effused
" serum—which these punctures discharge, although sometimes
" considerable, never creates any alarm; for however freely it
" may flow at first, it gradually diminishes, and soon sponta-
" neously ceases." This practice has been tried at Guy's Hos-
pital, and spoken favourably of. In the few cases in which
I have repeated the experiment, it did not appear to produce
any satisfactory result, and I rarely now have recourse to it.

Mr. A. C. Hutchinson has either revived or introduced the bolder practice of making incisions in erysipelas of the extremities. This gentleman's plan is to make several free incisions with a scalpel in a longitudinal direction, through the integuments down to the muscles, *as early* in the disease *as possible*, and before *any secretion* has taken place; these incisions to be each an inch or an inch and a half in length, to be two or three inches apart, and to vary in number from six to eighteen. These incisions, he adds,* yield from fifteen to twenty ounces of blood. Fomentations or saturnine lotions are to follow, together with attention to the bowels, antimonials, and an opiate at night. This practice, whatever benefit results from it, would come with a much stronger recommendation if Mr. Hutchinson had demonstrated its necessity; for he candidly adds, that "the cinchona, as recommended by Drs. Fordyce and Wells, I have never used in this species of disease until the fever and inflammation had been subdued by the means above stated; but in the only two cases of erysipelas erratica that came under my care, its exhibition was attended with the most salutary effects."

Mr. Lawrence is so far dissatisfied with Mr. Hutchinson's practice, as to recommend, as an improvement, one or more long incisions to be made through the inflamed skin, and also through the subjacent adipose and cellular textures, the seats of the disease. On examining, however, the cases instanced by Mr. Lawrence in favour of this improved practice, it ap-

* Med. Chir. Trans. vol v. p. 279.

pears that, out of sixteen patients treated by incisions, seven were previously and copiously bled, both generally and locally, and that this did not prevent the necessity of the incisions; while out of nine treated by incisions, and without previous bleeding, four died. These results are strong reasons for pausing before we submit a patient to so severe and dangerous an operation; and still more should we hesitate when we remember that the practice by incisions, to be successful, must be performed as early in the disease as possible, before any secretion has taken place; and, consequently, while the character of the affection is yet doubtful — conditions which make the calculation at least ten or fifteen to one that the patient would have recovered under the ordinary treatment, and which large odds are at once reduced by the practice of incisions almost to an equal chance of life or death.* It is not intended to be denied that the operation directed by the tact and judgment of Mr. Lawrence may not be occasionally necessary; but, nevertheless, in the practice of the physicians of even large hospitals, who unquestionably treat the largest portion of cases of idiopathic erysipelas, not one instance occurs in a twelvemonth in which the practice of incisions would give the patient additional chances of recovery.

The incisions have been proposed as a means of obviating gangrene; but every practical physician and surgeon knows how difficult it is to heal an erysipelatous wound, of which the following is an instance:—A patient was admitted into St. Thomas's Hospital with erysipelas of the upper portion of the thigh; and wine and bark having been administered, the disease subsided, but an abscess had formed, and it was necessary to open it. The dresser, however, whose duty it was to perform this operation, thought it necessary, instead of making a simple puncture, to dissect off all the loose integuments forming the abscess, so as to leave the muscles bare for a space about the size of the hand. In a few hours the erysipelas returned, gangrene followed, and the patient died. This case,

* In France, the practice of incisions is recommended by Rayer, while Vepeau says, that he had twice recourse to this treatment, and that both patients died.

however, scarcely presents a more formidable state of parts than when these long incisions are inflicted.

Among other modes that have been imagined for preventing the spread of the disease, has been that of cauterizing the boundary line by the nitrate of silver. It is difficult to understand the benefit that could result from this operation, nor has experiment determined in its favour. Broussais, for instance, says, "that it hastens the march of the disease, and occasions it to spread more widely." Blache and Chomel (p. 237), state, they have many times employed cauterization with the nitrate of silver in erysipelas of the face, when they apprehended an invasion of the scalp. Often in these cases the inflammation was circumscribed, but in other cases it continued to spread. This diversity of result has led them to investigate the state of the part under which these different consequences ensued; and they consider, that neither blisters nor cauterization are of any service, except in slight cases, and when the inflammatory edge presented no tumefaction, or in other words, when the disease was on its decline; for in those cases in which a bourrelet existed, or a tumefaction of the edge, neither the nitrate of silver nor vesication had any power to control the spread of the disease. Rayer also says, (p. 162,) "It has been thought that superficial cauterization "with the nitrate of silver quickly stopped the disease, but "the result of my experience does not accord with this "assertion." This practice was lately tried in a case in St. Thomas's Hospital, but the patient died.

Compression being a mode of moderating the afflux of blood to the part in erysipelas, has been spoken of favourably by Brettonneau. It has, however, but few advocates in this country; and it is difficult to conceive how this treatment can be applicable to a part sometimes so exquisitely painful that the weight of the sheet is distressing.

After a careful review of the preceding evidence, it seems to follow, that as we could not predicate from any of the known laws of morbid poisons any decided benefit from the use of local applications, so neither has the experience of the profession demonstrated in any sufficient degree their utility;

and this conclusion is strongly corroborated by the practice of Velpeau.* This eminent surgeon, in the course of three years, treated eighty-nine cases of erysipelas, principally traumatic. Of these, thirty-nine were treated by mercurial ointment, five by simple ointment, twelve by emetics and purgatives, eighteen by blisters, fourteen by leeches, seven by cauterization, fourteen by general bleeding, two by incisions, twenty-two by emollients; without any of these different modes of treatment,—“I will not say,” he adds, “stopping the course of the disease, but not even checking it in any appreciable manner.”

The treatment of the part after suppuration has taken place, is the simplest in surgery, or by poultices and bandages ; and it only requires to be mentioned, that when gangrene has taken place, the opening must be considerable to allow of the free escape of those large portions of sloughing broken down cellular tissue, which are ready to be discharged with the more fluid contents of the abscess.

Dietetic Treatment.—It is essentially necessary that the patient should be restricted to farinaceous food and to slops till he is decidedly convalescent.

Preventive Treatment.—The preventive measures are cleanliness, separation, and ventilation, and the attendants should be cautioned of the great probability of their contracting this disease in the event of any contravention of these rules.

* Journ. Hebd. 1834, tom. iii. p. 92.

PERTUSSIS

is a disease in which the poison produces a slight catarrhal fever, followed by a peculiar cough, of which the paroxysms occur at uncertain intervals. Its duration varies from a few hours to many months; and in its course, various structural lesions, either of the lungs, of the mucous membrane, of the alimentary canal, or of the serous membranes of the brain, are often set up. The poison, also, has the property of exhausting the susceptibility of the patient to its future actions, on the first attack.

OF THE POISON OF THE HOOPING-COUGH.

THE hooping-cough is of modern origin, but of later date than the exanthemata. Sprengel has traced it to the fifteenth; yet adds, it was better studied in the sixteenth century.* This disease first broke out in France, and was probably epidemic in Paris in 1510; for Pasquier† states, a cough prevailed in that year of such severity, the counsel could not make themselves heard, and the courts adjourned; that nobody knew what to make of it, and that the vulgar looked upon it as a divine punishment for singing a certain licentious vaudeville then in vogue. The patients are said, during this epidemic, to have worn a hood like a friar's coqueluchon, and hence the French term for the disease, or *coqueluche*, is supposed to be derived. The hooping-cough ravaged Germany in 1557, destroying a prodigious number of children, and in 1580 it was epidemic over all Europe.

Willis is the first medical writer who notices its prevailing in England, and he died in 1665. He speaks of it as well known in his time by the name of *Chin-cough*; as a disease to which children were principally liable; as being generally epidemic, and as occurring for the most part in the spring and autumn. He remarks, also, that it was seldom dangerous, and would run its course in despite of every mode of treatment. Sydenham, likewise, treats of hooping-cough, but considers it a more formidable disease, and as requiring a vigorous treatment.

Remote Cause.—The remote cause of hooping-cough beyond what has been stated is unknown. The disease, however, is common in the present day, to every country and

* Tom. iii. p. 84.

† Recherches sur la France, 4to. 1607, lib. iv. c. 25, p. 635.

every climate ; to the less genial parts of Europe and America, as well as to the East and West Indies; for Captain Franklin, in his expedition to the North Pole, found it raging among the northern Indians with fatal severity. It is a disease which prevails sporadically at all seasons of the year, but more especially in autumn, and is not unfrequently epidemic. The poison, consequently, must exist diffused through the atmosphere generally, though greatly varying, at different times, in quantity or in intensity.

Predisposing Causes.—The hooping-cough occurs in infancy, in adult and even in old age ; and is equally common to both sexes. The predisposition to this disease is so strong, that few persons pass the period of childhood without suffering from it, and from this circumstance we are unacquainted with the particular causes which predispose the body to the action of the poison.

When the hooping-cough is once excited, the patient's person secretes a poison which is both contagious and infectious.

Infectious.—The public are unanimously of opinion that the hooping-cough is infectious, and no parent will permit his yet unaffected child to mingle with such as may be labouring under the disease. This opinion is also that of the great majority of the profession ; and, from its universality, facts are absolutely wanting which should establish this law to demonstration. The general evidence, however, is abundantly sufficient for this purpose. The circumstance, for instance, of the susceptibility of the human frame to the disease being exhausted on the first attack, proves the fact of its being caused by a particular agent or poison ; while the spread of the hooping-cough, whenever it breaks out in schools or asylums for children, being as extensive as that of the exanthemata ; and also a similar impossibility existing of isolating the little patients in those establishments, or when sent home from school, so as to prevent the extension of the disease, demonstrate a strict identity of laws between those complaints and the hooping-cough, and, consequently, the infectious nature of the latter.

A small number of the profession, however, dissent from

this proposition. Laënnec, for example, says, "The general opinion is, that this disease is contagious; but its propagation by contagion* is not proved; while a sudden transition from heat to cold is sufficient to account for its production."† Billard‡ holds a more qualified opinion; for although he considers it "as epidemic rather than contagious," he admits "a certain specificity in the disease."

The arguments of these physicians are altogether inconclusive; for supposing the hooping-cough to depend merely on atmospheric changes, we should be liable to repeated attacks, which is not the case. But not only is their argument unfounded, but their experience is contradicted by the best authorities in medicine. Cullen, for example, states, that "hooping-cough is commonly epidemic, and manifestly contagious." Bateman, that "no antidote to the specific contagion is known." Good thinks it "contagious, though not in a high degree;" while Rostan§ gives some very striking examples of its transmission; and similar facts are supported by the names of Guersent, Dugès, Brettoneau, Dumeril and others, so that we may fairly conclude with Frank, "*nostro ævo nemo amplius de naturâ contagiosâ coqueluche dubitat.*"

Infecting Distance.—The laws of this disease have been so little studied that the distance the miasmata may extend from the patient, so as to infect a healthy and susceptible person, is not determined. But as the hooping-cough spreads in schools in the same wide and uncontrollable manner as the exanthemata, it seems fair to conclude that the range of the poison is of the same extent as in those disorders.

Contagious.—Since no cutaneous eruption accompanies this affection, the fact of its contagious nature cannot, as in the exanthemata, be strictly demonstrated by inoculation. The communication of the disease, however, by fomites, is an *à fortiori* proof of this law.

* The term contagion is by this and many authors used as synonymous with infection.

† *Traité de l'Auscultation*, tom. i. p. 156.

‡ *Traité des Maladies des Enfans*, p. 537.

§ *Médecine Clinique*, tom. ii. p. 352.

Fomites.—There is little doubt of the hooping-cough being often widely propagated by fomites. Rosen* affirms, “that the hooping-cough is governed by the same laws as the small-pox;” and he adds, “that it is contagious, and I have conveyed it from house to house without being aware of it.” Frank also says,†—“The hooping-cough is often propagated from “patient to patient, from house to house, and from village to “village, so that its path can be traced; and in whatsoever “place it establishes itself, as in foundling-hospitals, asylums, “families, towns, or districts, it seldom disappears till all the “children susceptible of it have taken the disease.” Panada, likewise,‡ adds, “that drinking out of the same vessel, sleeping in the same bed, wearing the same clothes, and using the same utensils, communicate the disease.”

In tropical countries the belief that the hooping-cough may be propagated by fomites is exceedingly strong. Ships, for instance, arriving at St. Helena with hooping-cough on board are immediately put under quarantine. On a late occasion a ship from the East Indies touched at that island, having seventeen children on board labouring under this disease, and was immediately submitted to those restrictions. The captain, however, requested permission to send the foul linen on shore to be washed, and, to his surprise, was refused; the reason assigned being that a similar request having formerly been granted, the hooping-cough broke out among the laundresses, and spread so extensively among the inhabitants, that upwards of sixty persons perished. In Van Dieman’s Land, also, they trace the introduction of the hooping-cough in that country to the arrival of a female prisoner in the year 1826-7, labouring under the disease; for previously it was unknown there, while subsequently many settlers and natives have fallen victims to it.§ This latter fact, of course, may equally prove either the infectious or contagious nature of the disease, but is a strong confirmation of the doctrine contended for.

Susceptibility exhausted.—The hooping-cough, as a general

* Versuche für die pract. Heilkunde, tom. i. p. 134.

† Prexcos Medice, part ii. vol. ii. ‡ Mem. cui aggiudicata, p. 41.

§ Eydoux Voyage autour du Monde, 1830-31-32.

principle, affects the same person but once during his life, and the exceptions to it are exceedingly few. Blache, however, gives an instance of a child labouring under the disease, being sent to his grandfather's, when both the grandfather and grandmother became affected, and suffered severely, for the three were frequently seized with the paroxysm of cough at the same moment, so that the scene which ensued was quite pitiable.*

Co-exists.—The poison of hooping-cough may co-exist with many other poisons, and in this case they often greatly influence each other's actions. The co-existence of hooping-cough and small-pox is instanced by Willan as entirely setting aside “an established opinion among physiologists, that two “specific diseases, at least two specific contagions, cannot “actuate the human constitution at the same time; for these “two complaints have been intimately connected for several “months past. In many instances the paroxysms of the “cough continued without abatement through the whole “course of the supervening small-pox. The hooping-cough “in other cases commenced during the eruption of the small-“pox, and remained a long time after without any material “alteration.”† In the same work, also, Dr. Willan mentions that, “in some cases this disorder was instantly superseded by the appearance of the small-pox, after the decline of which the cough returned with the same violence as at first.”

The measles and hooping-cough frequently co-exist in the same patient. I have seen three cases of this combination; they all occurred in the same family in the depth of a severe winter, and all proved fatal. Dr. Bateman‡ gives a case in which the hooping-cough, of six weeks' standing, was suspended by the occurrence of the measles, but returned on the decline of the latter. Hooping-cough has also been seen complicated with intermittent fever of every type, and in the cases mentioned by Desruelles, the cough became latent as long as the fever lasted, and then returned.§

* I have known the elder branches of many families who have passed through this disease, seized with a violent and intractable cough without the hoop, when the junior members have been labouring under the hooping-cough.

† Willan's Reports of Diseases of London, p. 38.

‡ Diseases of London, p. 91.

§ Traité de Coqueluche, p. 12.

Instances of the hooping-cough subsiding altogether, on the appearance of another disease depending on a morbid poison, are not uncommon. Dr. Adams mentions, that children were frequently brought to the Small-pox Hospital, labouring under hooping-cough, to be vaccinated, from a conviction on the part of the parents, that the cow-pox would prove a cure for the cough; and he adds, "in very chronic cases they were seldom disappointed." Mr. Okes* gives a case of a child labouring under hooping-cough, "more violent and shockingly convulsive" than any he had ever observed, whom it became necessary to inoculate, on account of the mother being seized with the natural small-pox; but as soon as the eruptive fever showed itself, the cough and its concomitant symptoms entirely ceased, and never more returned. A case, also, of the hooping-cough subsiding on the appearance of the measles, is given in the same volume. (P. 14.) The law of the co-existence of this poison with many others, is, therefore, distinctly proved.

Modes of Absorption.—If the law be established that hooping-cough is both contagious and infectious, it necessarily follows that the poison must be absorbed, both by the mucous membranes and by the cutaneous tissue.

Period of Latency.—Our knowledge of this fact is, at present, extremely imperfect. Guersent is of opinion, that the poison lies latent only five or six days after exposure to the infection, and he is probably correct; but he is certainly in error when he asserts that the disease can only be communicated when the cough is at its height, for there are many well authenticated instances of the infection being taken from children who have long laboured under the disease, and also from others only recently attacked. The miasmata, consequently, are generated from the commencement till the entire subsidence of the disease.

Pathology.—The poison of hooping-cough produces, at the commencement of the disease, a febrile stage, which lasts one, two, or three weeks. This is followed or accompanied by

* Medical Journal, vol. viii. p. 426.

paroxysms of coughing, which occur at uncertain intervals, and which terminate with the characteristic hoop. In the course, however, of the disease, the poison may produce inflammation of the tissues of the lung, or of the mucous membrane of the stomach and intestinal canal, or else inflammation of the serous membranes of the brain.

This disease, in its earliest stage, is merely a disease of function, and often continues so throughout its whole course; for many cases have been examined in which no trace of inflammation or other disease has been discovered in any part of the body. If the disease, however, be of greater severity, the poison often produces inflammation or structural alteration of parts, principally supplied by the eighth pair; affecting sometimes the organs supplied by the pulmonary branch of this system, sometimes those supplied by the gastric branch, and occasionally the organs of both. In attempting to demonstrate this law, it is to be regretted that so few writers have made mention of posthumous examinations in this disease, but the data we possess are nevertheless sufficient.

Rostan* says, "I have examined some children that have died of this disease, with great care, and I have constantly found alteration of the structure of the respiratory organs. The most frequent of these alterations is peripneumonia, either single or double, with pleurisy and catarrhal inflammation of the bronchial membrane." He states, also, that Guersent agreed with him "in considering hooping-cough as more especially a bronchial inflammation." Billard† likewise states, that posthumous examinations have seldom presented the same phenomena, unless it has been bronchial inflammation of greater or less intensity, and almost always accompanied by the accumulation of a considerable quantity of mucosities in the bronchia, which are sometimes sensibly dilated, and present a redness more or less vivid. Among the concomitant lesions, he adds, is inflammation of the bronchial glands. In one case, also, in which the bronchial ramifications were dilated, he found the air-cells filled with creamy

* Médecine Clinique, tom. i. p. 415.

† Traité des Maladies des Enfans, p. 539.

pus, and in addition to these lesions, he has found rupture of the air-cells or emphysema. Many writers, also, speak of the substance of the lungs being inflamed, and having, in some instances, passed into the state of red or grey hepatization ; and among them is Dr. Alderson, who seems to think that hepatization of the lung in hooping-cough differs from that of simple pneumonia ; “ for the lung in hooping-cough is “ always dense and contracted, as if the air had been expelled, “ and from the throwing out of the adhesive matter the sides “ of the vessels had been agglutinated together ; while in “ hepatization the lung is less dense than in hooping-cough, “ and is rendered more voluminous than in their natural state.”*

There can be no difficulty in admitting, on the authority of these writers, that inflammation does frequently exist of every tissue or membrane of the lungs or trachea, in hooping-cough, though more commonly, perhaps, of the mucous membranes ; and it consequently follows that the poison acts on the pulmonary branch of the eighth pair. But another class of facts remains to be investigated.

When the body of Robert Watt was examined,† “ on laying open the stomach, the internal surface had numerous red streaks, the marks of recent inflammation ;” there was, also, “ an universal crust of exudation, and much of it was collected on the upper surface, and not owing to the position of the viscera, when the body was examined.” In a case, also, related by Dr. Lettsom, of a child that had broken his thigh, and in this state had died of hooping-cough, the only morbid appearance was inflammation of the intestines. In two cases, also, of children that died at the London Foundling Hospital, in addition to the usual inflammatory appearances of the lungs, the mucous membranes of the stomach were in each case singularly red and injected (one of them universally so) ; and they were also filled with the glairy matter vomited up in the disease. In another case, also, the stomach was not perceptibly diseased, but the glandulæ segregatæ and aggregatæ throughout the whole course of the

* Med. Chir. Trans. vol. xvi. p. 91.

Watt on Chin-cough, p. 112.

large and small intestines, were in the first stage of inflammation; so that the mucous membrane was beautifully studded with these now enlarged and transparent bodies, each having its duct marked by a plainly visible black point in the centre. The contents of the intestine, in this case, consisted of a large quantity of perfectly white mucus, scarcely stained by the presence of a particle of bile, or of any faecal matter. This affection, however, of the glands was not accidental, for out of nine cases, examined by Blache, he found in five the elliptical patches of Peyer "assez saillantes," and the follicles of Brunner very numerous, and "assez volumineux." It seems, therefore, proved, that the gastric branch of the eighth pair is occasionally the seat of the specific actions of the poison of the hooping-cough, as well as the pulmonary branch.

It is questionable whether the occasional complications of this disease, with meningitis and hydrocephalus, are the result of a specific action of the poison, or whether they are merely a consequence of the violent convulsive agitation of the cough causing a local plethora. Blache appears to be of the latter opinion; for he states, that the cerebral symptoms could not be accounted for in his cases by any alterations of structure, discoverable either in the substance of the brain or its membranes, since, with the exception of a slight alteration which did not always exist, the brain, the chord, and their membranes, were in a healthy state. In one case, however, in which death had been preceded by coma, and almost complete insensibility of the skin, he found a white ramollissement of the voûte à trois piliers, with meningitis of the convexity.

When the head is affected in the hooping-cough, the following appearances have been found. In a child four months old, examined by Mr. Smith, a gentleman of considerable talent, and formerly a student of St. Thomas's Hospital, the larynx, trachea, bronchia, substance of the lungs and pleura, as well as the stomach, intestines, and chylo-poietic viscera, generally were healthy. The vessels of the dura mater, however, were turgid with blood, the pia mater greatly injected, some effusion between the membranes, and about two ounces of bloody serum in the ventricles. The substance of the brain

had also more puncta cruenta than usual.* A similar case is recorded in the same work† by Dr. Webster, in which nothing was found but great vascularity of the membranes of the brain, with effusion of serum between them, and also into the ventricles.

Symptoms.—The symptoms of the hooping-cough arise out of the previous fever, the cough, and the various neuroses or inflammations of the different organs affected.

The law that fever precedes the cough, though generally true, has many exceptions ; for the paroxysm is often established, and more particularly in summer, without being preceded by any increase of heat or other febrile phenomena. The severest attack seldom exceeds that which accompanies an ordinary catarrh, and, therefore, rarely confines the patient to his bed.

Hooping-cough has been divided into pertussis mucosa, and into pertussis inflammatoria ; but it is extremely difficult, perhaps impossible, to determine where the catarrhal symptoms end, and the inflammatory symptoms begin, so that it will be less objectionable to distinguish hooping-cough by its gradations rather than by its varieties ; the forms of this disease, therefore, will be—

PERTUSSIS MITIOR. PERTUSSIS GRAVIOR.

Most authors divide the group of symptoms, of which the hooping-cough is composed, into three stages, termed by Frank, stadium invasionis, stadium acmes, and stadium declinationis. The first stage comprehends the period from the first symptoms of illness until the hoop confirms the nature of the cough. The second stage commences from the time the nature of the cough is determined, and lasts until the great violence of the disease and the danger of inflammation be past. The third stage is from the end of the second stage, until the final and happy termination of the disease.

First Stage.—The early symptoms of the hooping-cough, and more especially in the spring and fall, are those of a common cold, as hoarseness, sneezing, a watery discharge from

* Med. Chir. Jour.

† Vol. v. p. 193.

the eyes and nose ; much oppression at the chest, cough, impaired appetite, disordered bowels, and such fever as usually attends an ordinary catarrh. This stage usually lasts from four to eight days ; but Willan has estimated it at from one to two or three weeks.

Second Stage.—It is not until the fever remits and is about to pass away, that the cough which had distressed the patient is followed by the characteristic hoop. On the occurrence, however, of this symptom, the disease is fully formed, and now consists of a series of fits or paroxysms of cough, which occur at uncertain periods ; while, during the intervals, the little patient often enjoys his usual health, recovers all his gaiety, returns to his play, and relishes his food with good appetite. A paroxysm or fit of the hooping-cough is as follows :—

The approach of the fit is often denoted by an unpleasant titillation of the glottis, by a sharp pain in the chest, or else by a spasmodic contraction of the diaphragm. As soon as the child is thus warned, he instinctively runs to his nurse, and either grasps her arms, or lays hold of a chair to support himself during the paroxysm, which, in a few seconds, or a few minutes, follows. In severe cases, the cough is almost convulsive, the action of the diaphragm powerful and rapid, so that the air being suddenly expelled from the lungs, the patient, half suffocated, turns black in the face, and frequently passes his urine. At length the crisis approaches ; the diaphragm relaxes, and a full and violent inspiration is followed by the loud characteristic hoop. This sound remits, but after a few seconds returns ; and these convulsive expirations and inspirations continue till the patient is at length relieved by a copious expectoration, or by vomiting. In the latter case, the matter thrown up is a glairy fluid, of much tenacity, semi-transparent, and frequently amounts to the greater part of a pint. If, however, the patient has just eaten, the food sometimes returns with it ; but often the stomach, by a kind of election, retains the food, and rejects only the offending matter. If the fit be violent, the fluid rushes not only from the mouth, but also from the nostrils,

and in some instances is mixed with blood ; for blood occasionally bursts in considerable quantities from the congested vessels of the mouth, the nostrils, the ears, the eye-lids, and in some cases from the lower orifices of the body.

When the stethoscope is applied to the chest, previous to the fit, we sometimes detect the mucous rhonchus common to catarrh, yet, in most cases, the respiration is natural. During the act of coughing, the respiration is completely suspended, and not sensible to the ear in any part of the chest. On the hoop, however, taking place, the air is heard to rush with remarkable violence into the trachea, and as low as the bifurcation ; but at this point* it stops for one or more seconds, till the bronchial tubes relax and admit it into the lungs.

From this description it is plain that during the paroxysm, the diaphragm contracts so considerably as to reduce the area of the chest to its least possible dimensions, while the muscular fibres, both of the bronchia and trachea, are strongly contracted, and, perhaps, to the greatest extent that the mucous membrane, completing the imperfect cartilaginous rings, admits. The hoop is caused by the fibres of the glottis continuing contracted after the spasmodic actions of the diaphragm and trachea have relaxed ; when, however, the fibres of the glottis are equally relaxed with those of the trachea, bronchia, and diaphragm, the respiration becomes natural, and the fit or paroxysm terminates by an inverted action of the muscular fibres of the stomach discharging the contents of that viscus.

The fit having subsided, the eyes of the patient, which had nearly started from their orbits, resume their natural position, but are inundated with tears, or else the conjunctiva is slightly congested or gorged with blood. The black swollen face also recovers its natural expression, while the turgid veins of the head and neck subside, so that in a few minutes, in favourable cases, the patient's strength and spirits are renewed, and his appetite for food returns. On the contrary, in severe or unfavourable cases, the head aches, the exhaustion continues, and fever comes on, the preludes to severe disease

* Guersent, Dict. de Méd. 18 vol. tom. vi. p. 9.

of the lungs, of the stomach, or of the head, which endanger the life of the patient.

The paroxysm varies greatly in frequency and severity; but as a general rule its frequency is as its severity. In ordinary cases it returns every two hours; but in severe cases, and especially during the second or third week, it returns every half, or every quarter of an hour, or even oftener. The disease commonly reaches its acmé at the end of the third, fourth, or fifth week, after which the paroxysms diminish in frequency, the intervals are prolonged, and as soon as the patient is to a certain degree convalescent, the third stage commences. The duration of this second stage is from two to six or eight weeks.

Third Stage.—The third stage commences as soon as all danger is past, which is denoted by the paroxysms becoming milder, the intervals longer, the expectoration or vomiting diminishing, and by the general health of the patient improving. In this last stage, however, though the symptoms are greatly mitigated, still the characteristic hoop often remains, and harasses the patient for many weeks, or even many months. The duration of this stage, it will be seen, is long and variable; and it is during this period that the term chronic is usually applied to the disease.

The whole duration of the stages of hooping-cough, is liable, perhaps, to greater variations than that of almost any other disease; for the disease may consist of only a few paroxysms, and terminate in two or three days, while it more commonly lasts two, three, or four months, and, in extreme cases, more than a year.

Such is the progress of pertussis mitior, or as long as the disease is limited to a mere neurosis of the parts affected; but, in particular seasons, and in particular idiosyncrasies at all times, the many accidents that have been mentioned may occur to complicate its symptoms, and to increase its dangers; as inflammation of some of the tissues of the lungs, of the mucous membrane of the stomach or intestines, or of the serous membranes of the brain.

Inflammation of the mucous membrane of the bronchia

is the most usual complication in hooping-cough. The form of inflammation may be that in which the secretions are in defect; so that the mucus is not only greatly diminished in quantity, but thick and viscid, teasing the patient with fruitless efforts to relieve the lung, and thus causing a frequent occurrence of the paroxysm. In other cases, it may assume the form of purulent inflammation; the pus secreted being moderate in quantity, and formed into sputa, or else so enormously great, as to amount to one or two pints in the twenty-four hours, and so pure and unmixed, as to resemble that from an abscess. The inflammation of the bronchial membrane may spread to the substance of the lungs, when the danger and symptoms of the various forms of pneumonia will be added to the disease; but the most formidable accident is when the pleura is inflamed, for then the patient's sufferings, during the paroxysm, are fearfully increased from the agonizing pain inflicted by this generally fatal complication, during the cough.

The stomach and intestines are sometimes more particularly the seat of inflammation than even the lungs. Inflammation of the mucous membrane of the stomach is denoted by pain at the epigastrium, and by the suppression of the glairy fluid thrown up by vomiting. In this case, the severity of the paroxysms is also dreadfully increased, for the patient is sometimes so overpowered, that he falls down suddenly, as in apoplexy,* or, on the termination of the fit, lies in a state of complete exhaustion, unable to discharge any thing either from the lungs or stomach, or even to hoop; and he is now said to labour under the *dumb kink*.

In mild cases of hooping-cough, the bowels are little affected, and are either natural, or else slightly costive, or slightly relaxed. There are a few instances of the bowels being relaxed from the beginning; and in these cases, the patient often passes his stools involuntarily during the paroxysm. In severe forms of the disease, however, the stools assume one of two characters, and are foul, black, and offensive, or else consist of a colourless mucus. In either case, the patient

* Heberden. Commentarii.

cannot be pronounced out of danger till the fæces assume a natural and healthy appearance ; but the disease is most severe when the stools are colourless, that circumstance evidently depending on an inflamed state of the intestinal follicles.

The action of the poison, or else the violence of the cough, often produces great and dangerous affection of the head. Head-ache is a symptom which usually attends the catarrhal stage, but it generally ceases when the fever subsides. In some instances, however, it continues throughout the disease, and is then not unfrequently the forerunner of convulsions or of epilepsy, or else of inflammation of the membranes of the brain, terminating in delirium, coma, hydrocephalus, and death.

Diagnosis.—It is impossible to determine whether the febricula of the first stage will terminate after the manner of a simple catarrh, or will on its subsiding give rise to the hooping-cough ; as soon, however, as the cough has been followed for two or three paroxysms by the *hoop*, the diagnosis is perfect, no other disease being accompanied by this symptom.

Prognosis.—The proportionate number of deaths to recoveries in hooping-cough is not determined, but it greatly varies in different years ; for in one year, says Frank, hardly a death will occur in a large city, while in another many children will fall, (p. 841.) In general, however, pertussis mitior is rarely fatal, while pertussis gravior, or inflammatory hooping-cough, is very commonly so. The gravity of the prognosis, therefore, will depend on the disease assuming the one or the other of these forms. When the latter, it has been observed, that more females die than males, and that the disease is more dangerous in the cold than in the warm months of the year.

Infants at the breast, and children during dentition, having a greater liability to affections of the head, die perhaps in larger proportions than children of a more advanced age, or than adults.

If any other disease depending on a morbid poison attack the patient during the hooping-cough, the danger, with very few exceptions, is greatly increased, unless the latter becomes latent.

When the hooping-cough is severe, and followed neither by vomiting or hæmorrhage, it has been observed that the paroxysms are frequently followed by convulsions, or apoplexy.

A hard dry cough, difficulty of respiration, or other symptoms denoting inflammation of any tissue of the lungs, of the alimentary canal, or of the membranes of the brain, greatly diminishes the chances of recovery.

The more frequent the paroxysm, the greater the danger.

The occurrence of fever during the intervals of the cough is always alarming, as it marks the existence of some local inflammation, or else of some constitutional taint, as phthisis.

The favourable symptoms are lengthened intervals between the paroxysms, especially during the night ; an easy expectoration, an irresistible desire for food after vomiting ; also, the absence of pain of the head, and of all symptoms denoting local inflammation.

Treatment.—The symptoms of the first stage of the hooping-cough do not exceed those of an ordinary catarrh, and in the second stage they merely denote, in the great majority of cases, disordered functions of the parts affected, while in a few cases only does inflammation of the various organs or tissues exist.—With these facts to guide us, and with the universal admission that we possess no antidote to the poison, what is the mode of treatment we ought to adopt ?

The indications for bleeding being trifling in the greater number of cases, few persons have recommended that operation, or have spoken of it in terms of unqualified approbation ; Sydenham, however, conceives it to be essentially necessary in the cure of this disease, for he says,* “ By this practice of “ venesection, and of repeated purges, and by this only, is “ conquered the convulsive, or hooping-cough in children ; an “ obstinate disorder, which scarcely any other method will “ subdue.”

Cullen and Dr. Dewees, though among its warmest advocates, are extremely qualified in their recommendation of bleeding.—Cullen says,† “ From this view of the matter I

* Wallis's Sydenham.

p. 464.

† First Lines, vol. i. p. 229.

" maintain, that at the beginning of the disease, and for some time after, the remedies to be employed must be such as may obviate the violence of the disease, and the fatal tendency; but after the disease has continued for some time, and is without any violent symptom, the only remedies which can be requisite are those which may interrupt its course, and put an entire stop to it sooner than it would spontaneously have ceased. For answering the first indication in plethoric subjects, or in others, when, from the circumstances of the cough and fits, it appears that the blood is with difficulty transmitted through the lungs, blood-letting is a necessary remedy, and it may be necessary even to repeat it at the beginning of the disease; but as spasmodic diseases do not commonly admit of much bleeding, so it is seldom proper in chin-cough to repeat this remedy often."

Dr. Dewees considers that bleeding in the hooping-cough seen in America, "to be for the most part indispensable," yet adds, "that immediately after bleeding we have recourse to hive syrup," (a medicine which contains a considerable quantity of a powerful bitter tonic, or seneka root;) and he concludes, "We wish it to be understood that we do not prescribe bleeding or loss of blood in every case of hooping-cough, as it may often present itself without the symptoms which would justify this, or perhaps any other remedy."

The authority of Sydenham, however, has so much influenced the practice of medicine, that it has occasionally led to the adoption of his system in the treatment of this disorder, but evidently with very unsatisfactory results. Dr. Millar says,* "On so great an authority, in my early practice I treated this disease in the manner he recommended. Finding it, however, not only ineffectual, but having some reason to believe that it was productive of very bad consequences, I was induced to make trials of other methods of cure." Upon the whole then (p. 174,) it appears, that the anti-phlogistic method has been too generally adopted without

* On Hooping-cough, p. 129.

" sufficient examination,—also, that some of the most approved practical authorities, as Hoffman, Fothergill, &c., are altogether silent upon it, and have treated the disease in a very different manner, and that most of those who have bled have had recourse to astringent remedies to repair the injuries it naturally occasions, and that others have entirely rejected it." Watts* and Laëneç† appear also to have tried bleeding as a mode of curing this disease; but the former says, "With regard to bleeding in general I would remark, that it is not to be regarded as a regular part of the treatment of hooping-cough;" while the latter affirms, "that bleeding is rarely so useful in coqueluche as in other varieties of pulmonary catarrh."

It will be seen from the foregoing quotations, that, with the exception of Sydenham, those physicians who recommend bleeding, have practised it upon a very limited scale, and have admitted its injurious consequences when carried beyond that point. Other authorities also, of great experience in the disease, have altogether abandoned bleeding after trying it, and have adopted other modes of treatment, as they believe, with greater success. It follows, therefore, that bleeding in the hooping-cough is not an essential, but on the contrary, only an occasional mode of treatment, applicable when some organ or tissue is inflamed, and which threatens the patient's life.

As children are much relieved in this disease by frequent vomiting, it has been proposed and attempted to cure it by means of emetics. Hoffman appears to have been the first physician who adopted this practice in an extremely malignant hooping-cough, that prevailed at Berlin in 1709. His formula was a grain of tartar emetic for persons above twelve years old, and he repeated this dose every second day, adding, "Longe optimum et desideratissimum præstat effectum."‡ Fothergill followed the practice of Hoffman, but repeated the emetic daily;§ or if the fever was vehement, gave half the quantity in order to promote diaphoresis; and he assures us that by pursuing this practice he seldom had any occasion to

* On Chin-cough, p. 241.

† *Traité de l'Auscultation.*

‡ Hoffmanni Opera, tom. iii. sect. 2. c. 3.

§ Lon. Med. Obs.vol. iii. p. 319.

bleed, or to use any other kind of medicine, unless to procure a stool or two daily, for which purpose magnesia given at bed-time with the antimonial seldom failed of answering his expectations. Dr. Cullen is equally favourable to the use of emetics; for he says, (sec. 1419,) "of all other remedies "emetics are the most useful in this disease, both in general, "by interrupting the return of the spasmodic affections, and "in particular, by determining very powerfully to the surface "of the body, and thereby taking off determination to the "lungs. For this purpose I think full vomiting ought to be "employed, and in the intervals necessary to be left between "the times of full vomiting, nauseating doses of antimonial "emetics may be useful." The use of emetics is also supported by Burns, Watts, and by many other physicians.

The superiority, or even the propriety, of an indiscriminate treatment by emetics, is, however, any thing but proved, for Dr. Millar states, that he abandoned the use of them on observing the greater efficacy of assafoetida; while Dr. D. Home, in his clinical experiments, says he was unable to derive that advantage from their employment which Dr. Fothergill ascribed to them in his own practice. In estimating the real value of emetics in hooping-cough, it is quite certain the physicians who recommend their indiscriminate use, and from the very commencement of the disease, must be in error; for there are a large number of cases that will do well under the simplest remedies, perhaps merely by abstaining from animal food, together with ordinary attention to the bowels, and consequently by no means require a treatment so severe and so distressing. It is certain, also, they can be of little service when the vomiting or expectoration is easy, which is the fact in a great majority of instances; likewise, that they must be injurious in all cases when a tendency to cerebral congestion, or to gastric or intestinal inflammation, or to pleurisy exists. As these exceptions, however, form by far the largest proportion of the whole number of cases of the hooping-cough, it results that emetics cannot be the rule of treatment, but are only occasional remedies, their beneficial effects perhaps being limited to a small class of patients, in whom the

bronchial secretions are either in defect, or else so abundant that they cannot be discharged by the unassisted efforts of nature, or to cases in which the hooping-cough is combined with pneumonia. The cases, therefore, in which emetics are really useful, are reduced to a very small number, or to those in which some particular forms of bronchial inflammation or of pneumonia exist.

When it is thought expedient to exhibit an emetic, our choice lies between three substances, or ipecacuanha, antimonium tartarizatum, and squills. It is generally admitted, however, that ipecacuanha or antimony is preferable to squills, and moreover, that ipecacuanha is preferable to antimony. Many practitioners prefer a combination of ipecacuanha and of antimony, and in this case the dose for a child two years old, is two grains of ipecacuanha with one-eighth of a grain of antimonium tartarizatum, to be repeated every quarter of an hour till vomiting is produced. Some practitioners recommend nauseating doses of these substances to be given in the intervals of the daily vomiting, but it should be remembered, that young children never expectorate.

Besides the practice by bleeding and emetics, it has been attempted to cure the hooping-cough by the exhibition of antispasmodics from the very commencement of the disease. Dr. Millar introduced with this intention the use of assafoetida, having observed, as he states, that it was much more beneficial than the treatment by emetics; and he adds, that in a year that hooping-cough was epidemic, no person who took it was confined even for a day by sickness, and that no other medicine was given except an occasional dose of rhubarb and magnesia. The experience, however, of other physicians has by no means borne out this favourable report of Dr. Millar; for the utmost that Frank can say is, that an enema, containing a scruple of assafoetida, may be thrown up, when convulsions supervene; while Dr. Dewees asserts, that his experiments are not calculated to advance the reputation of its powers,—“We have found it occasionally useful, but never of decided efficacy.” A slight consideration of the subject will show these objections to be not unfounded; for it will be

evident that, unless assafœtida or other substances of its class possess a specific power in controlling the poison of the hooping-cough, which is no where contended for, its use in the commencement of the disease must in many cases be hurtful, as it must often predispose to those inflammations which are liable to occur in the second stage of the disease. There can be no question, however, that when all danger is past, it must be extremely useful in controlling the spasmodic violence of the cough, and in breaking the habit of recurrence. Having thus examined the value of bleeding, emetics, and anti-spasmodics, in the cure of hooping-cough, it now remains to point out the treatment more usually adopted and recommended.

The stage of invasion is seldom marked by symptoms of greater severity than those of common catarrh, and consequently, except attention to the bowels, there is little occasion for medicine.

The hoop being confirmed, and the second stage established, two indications of treatment present themselves. The first is to take those precautions which may tend if possible to prevent convulsions, or any attack of inflammation, either of the lungs, the stomach, or of the membranes of the brain. The second indication is, after the period when inflammation usually occurs is passed, to prescribe such medicines as may interrupt the course, and anticipate the time of the spontaneous cessation, of the disease.

The best mode of obviating the danger of the occurrence of cerebral irritation, or of inflammation of any of the organs that have been mentioned, is to control, as far as possible, the frequency of the paroxysms, to check those secretions which are in excess, and to excite those which are in defect; and these objects are best attained by mild opiates, combined with gentle purgatives or laxatives.

The choice of the opiate has been considered a matter of much importance. The continental physicians have bestowed the greatest praise on belladonna, and it must be admitted that it is useful in hooping-cough. But it possesses no specific properties, and the opinion of the profession is perhaps, with

respect to this medicine, well expressed by Blache,* who says, "I have often tried this substance, but have scarcely ever found any but negative results." Butter and Storck have strongly recommended henbane; but Cullen says, "in our trials it has often disappointed us." It must be admitted, therefore, that neither belladonna, henbane, opium, or any other narcotic, possesses a specific property, and the selection of the opiate must be left to the discretion of the practitioner. But it should be remembered, that when the head is threatened, hyoscyamus, or the syrup of poppies, is to be preferred; also, that the dose, whether of opium,† hemlock, henbane, or belladonna, should be small, for liberally employed, they either oppress the brain or diminish the secretions of the bronchial membrane, or else allow them to accumulate to an inconvenient degree. From these circumstances, in children under four years of age, the dose of belladonna ought not to exceed one-eighth to a quarter of a grain, or that of hyoscyamus, two grains, every six or eight hours. The syrup of poppies, however, when *rightly* prepared, is the best medicine for very young children, and should be given in such fractional doses of a drachm as is suited to their age.

But opiates, in the early stages of the disease, ought not to be administered alone, for the bowels are commonly constipated in hooping-cough; and every practitioner must have observed the relief obtained by regulating the alvine discharge. Some purgative or laxative ought, therefore, as a general rule, in all cases, to be combined with the opiate. The selection of the particular medicine is, perhaps, unimportant, provided its action be so regulated as not to produce more than two or three motions in the twenty-four hours. Bateman, indeed, strongly recommends calomel, in preference to all other purgative remedies; still, as he has not shown mercury

* Archives Générals, Serie II. tom. iii. p. 353.

† Willan says (Diseases of London, p. 180), "In mitigating the severity of the cough, and in prolonging the intervals between the paroxysms at the latter period of the disorder, I have found the watery solution of opium more efficacious than the extract of hemlock, or any other narcotic medicine hitherto employed."

in any form to be an antidote, it cannot possess any demonstrable advantage over vegetable or saline purgatives ; and as the continued use of a purgative is often necessary throughout the whole disease, calomel, from its tendency to affect the mouth, seems objectionable. The prescription I have been most in the habit of employing, is, Rx. syrapi papaveris cum magnesiæ sulphatis aa 3ss. to 3j. ex mist. camphoræ ; and I have seen many patients recover under this simple treatment. It is probable, that the confectio sennæ, or castor oil, or perhaps any other mild purgative, would answer equally well, but there are few so conveniently administered. This mode of treatment generally puts the disease in a safe train, and is in many cases sufficient to ensure its termination in a moderate time.

In the second stage, the symptoms of the hooping-cough may assume those of pertussis gravior ; and cerebral irritation, with convulsions or inflammation of the membranes of the brain, of the substance or tissues of the lung, or of the alimentary canal, may complicate the disease ; and then the treatment of the case is always exceedingly difficult, and frequently unsuccessful.

When the hooping-cough has terminated fatally, and with convulsions, it has often happened that no trace of inflammation, either of the brain or its membranes, has been found ; so that the convulsions must have arisen from mere disordered function or neurosis of that organ. Any considerable depletion, therefore, must be unnecessary and improper ; neither have I observed the application of ice, or of evaporating lotions to the head, sensibly influence the disease. Opiates, however, in small doses, often mitigate both the paroxysm of cough and the convulsion ; and assafoetida enemata may likewise be thrown up. When the convulsions are combined with a suppression of the usual glairy discharge, the chance of benefiting the patient arises out of a careful investigation of the state of the mucous membrane of the bronchia, and of the alimentary canal, and the application of leeches, blisters, or mustard poultices, over the affected part.

Inflammation of the membranes of the brain is always

preceded by considerable headache ; and if in the intervals of the paroxysms this symptom be constant, leeches should be applied to the temples or forehead, in such numbers as may either entirely remove it, or else give considerable relief. This is a precaution which ought not to be neglected, lest effusion take place, after which no medicine can save the patient.

When the poison excites inflammation of the tissues or of the substance of the lungs, bleeding is imperatively required to a limited amount ; but we should be satisfied with such mitigation of symptoms as may obviate immediate danger ; and even that is not always obtained. Blache, for instance, bled in nine cases, either with the lancet, by leeches, or by cupping ; and in one case no less than five times ; yet, he adds, with “ a desolating want of success ;” and eight out of the nine cases terminated fatally. This result makes him add, that there is in severe hooping-cough, as in typhus, cholera, and many other affections, an unknown element which controls all these intercurrent inflammations. Dr. Dewees also conceives, when inflammation exists, “ it exhibits a very peculiar “ character, owing, perhaps, to the nature of the cause by “ which it is excited ; for, unquestionably, it is far less “ obedient to the usual remedies than ordinary inflammation.” The quantity of blood, therefore, should not only be limited in amount, but should also vary according to the tissue affected ; for supposing the inflammation to be limited to the bronchial membrane, bleeding has little power to control it, and consequently the blood should be sparingly drawn ; and leeches or cupping are preferable to the lancet in these cases. A blister, also, should be applied to the chest, or between the shoulders, and may be kept open, either by a linseed poultice or in the usual manner by the unguentum sabinæ. Emetic or nauseating doses of ipecacuanha, or of antimony, are also occasionally but not greatly serviceable.

If the substance of the lung be the seat of inflammation, blood may be drawn more freely, and by the lancet, but still moderate in quantity.* The medicines I prefer in these

* Bateman says, (*Diseases of London*, p. 164,) “ We believe that no instance of pneumonic inflammation is generally found so difficult of management as

cases, are ipecacuanha and calomel, in the proportions of two grains of the former to half a grain of the latter ; and should the pleura participate in the inflammation, blood should be drawn more liberally still, and calomel, in proportion to the symptoms, be exhibited twice or more times a day.

In the event of the mucous membrane of the stomach being the seat of inflammation, leeches should be applied to the epigastrium, followed by a mustard poultice ; or should its seat be the mucous membrane of the intestinal canal, the same remedies should be applied over the abdomen. The character of the stools must govern the medicines to be exhibited ; for if they be muciform, denoting affection of the follicles, enemata of barley water, with the syrup of poppies, should be thrown up night and morning ; while in cases in which they are foetid, purgatives, containing a portion of calomel, are strongly recommended by Watt and other writers. Such is the treatment which has been found beneficial in the second stage of the hooping-cough, and when complicated with inflammation.

The disease having passed into the third stage, and the inflammation, if any has existed, having subsided, it is desirable to attempt to abridge the duration of the cough, which often extends to a most distressing length ; and for this purpose tonics, antispasmodics, and other remedies, either external or internal, have been recommended.

The more stimulant antispasmodics, such as assafœtida, musk, castor, oil of amber, cantharides, and camphor, are the remedies that have acquired the most suffrages in the cure of this stage of the hooping-cough. But the two first are most esteemed. Millar considered assafœtida as a specific ; and Dewees speaks highly of that substance, though he prefers garlic, in the dose of one-third of a common sized clove, for a child of six or seven years old. Musk is a still more favourite remedy than assafœtida, and is strongly recommended by

" that which supervenes on hooping-cough ; since it seldom takes place till the
" little patient is greatly reduced in flesh or strength by the continued irritation
" of the disease, and when, of course, evacuations sufficient to remove the inflam-
" mation are not to be borne with safety."

Fuller, Horn, Stoll, and Danz, who all speak of its good effects; as do Hufeland and De Berger, who have given it in large doses. Frank says it is the safest of all remedies, “*Tutissimus moschi usus presertim infantibus sensilibus.*”* Dewees, also, speaks of it being useful; as likewise Guersent, who employs it even in the second stage in very young children, when the cough has not yielded to emetics.

Cinchona bark has, by many physicians, been preferred to antispasmodics. Cullen esteemed it so highly, (sec. 1425,) that he says, “I consider the use of this medicine as the most certain means of curing the disease in the second stage;” “and when there has been but little fever present, and a sufficient quantity of bark given, it has seldom failed of putting an end to the disease.” De Whytte is of a similar opinion; and says, “In the chin-cough, when given early, and before any obstructions are formed in the lungs, I have found the Peruvian bark one of the best remedies.”† But notwithstanding these favourable recommendations, bark is seldom used in the present day; and Desruelles (p. 272) affirms that, when given in cases of intermittent fever combined with hooping-cough, it aggravates the latter, and is not useful in any other case.

Hydrocyanic acid has been recommended by some authors; but Desruelles proscribes the use of this medicine, which, he adds, “has been so deplorably abused in chronic inflammations of the lungs;” while Blache thinks its use “not without danger.” Hydrocyanic acid is certainly esteemed, in the present day, far beyond its real value. I have given it, and seen it given, in a great variety of disorders, but with no satisfactory result. In small doses it is a harmless, pleasant bitter, as every good housewife knows; while in larger ones it is dangerous; and a medium dose is with difficulty obtained, from the readiness with which the pure acid is volatilized. I tried this substance as it exists in native combination, in the bitter almond, some years before its late revival in medicine, (for

* The formula Frank recommends is, moschi, gr. ij. mucilaginis gummi Arabici, et syrup rosæ, āā 3ij. aquæ rosæ ȝi.; a tea spoonful to be taken every second hour.

† Observations on the Diseases, &c. p. 349.

the laurel water is a formula of all the old pharmacopœiaæ,) and abandoned it as an entirely useless remedy.

Of metallic tonics, the oxyde of zinc, from its conjoined emetic and tonic powers, is the only one at present used ; but the opinion of Guibert is probably correct, " that although it " has appeared to diminish the violence of the symptoms in some " cases, yet its action is by no means so constant as to enable " us to rely on it." Of astringent medicines, alum, or alum whey combined with rhubarb, has been considered the best.

The medical treatment of hooping-cough cannot be more properly concluded, than by the following quotation from Dr. Bateman :*—" Arsenic has been recommended in the " cure of hooping-cough, and by no less an authority than " that of Dr. Ferriar; we should, therefore, hesitate in rejecting it upon a brief trial ; but in three cases it appeared to " have no obvious influence on the disease ; while under the " use of digitalis, with slight anodynes, the little patients " seemed to improve. At the same time it must be acknowledged, that their progress was so slow, as to excite much " doubt whether the amendment were the result of the operation of the medicine, or of the spontaneous movements of " the system. In truth, my experience does not lead me to " be very sanguine of the power of drugs over this disease ; " the milder cases will generally disappear spontaneously, " after a certain course ; and the more severe ones do not, I " think, readily yield to the same active treatment which is " ordinarily successful in simple pneumonia. There is room " for much fallacy, and therefore necessity for much caution, " in drawing inferences respecting the operation of medicines " in diseases of slow progress and considerable duration, in " which no marked change speedily ensues, and when the " natural tendency in a large majority of cases is to recovery. " Hence, perhaps, there is no disease for which so many " *specifics* and infallible nostrums are promulgated with confidence, or so few actual remedies known for the complaint " in question."

* Diseases of London, p. 165.

Topical Remedies.—When internal remedies have failed in the treatment of hooping-cough, many physicians have attempted to cure it by means of derivatives. Hercatus, after having exhausted other remedies, applied actual cautery to the occiput, or else setons to the neck. This severe practice has not been found successful, and blisters have been tried. But Desruelles is opposed even to the use of blisters, as well as to topical remedies generally, which he thinks (p. 305) “ do not abridge the duration of the hooping-cough in any case, while in some they augment its intensity.” The testimony of Watt, however, is something more favourable, (p. 243,) for he says, “ I “ have seldom omitted applying one in cases when the breath “ was much affected. I must, however, say, that I have not “ seen much advantage from blisters, till after the violence of “ the disease has been subdued by other means. After the “ fever, and more urgent symptoms, have been removed by “ bleeding, purging, and other means, a blister may be ap-“ plied with the very best effects.”

Autenrieth states, that he cures hooping-cough by rubbing the unguentum antimonii tartarizati upon the epigastrium; and that he gives no medicine internally, throughout the disease. It is to be regretted, that few other practitioners have obtained his success by employing the same means. Marcus thinks this mode of treatment is greatly distressing to children, and that no other good results from it than is produced by their being kept in bed. Boisseau says, it does not abridge the duration of the disease; while, from the irritation it occasions, it renders the access of the fits more frequent. Desruelles, (p. 311,) says, he has very frequently employed the pommade stibiee in the hooping-cough; and that his observation accords with that of Bourdet, Gilbert, Leveillée, and Ozanam, “ that the disease is not diminished in severity, nor shortened in its course; and I think, therefore, this ointment is useless.”—While Frank exclaims, “ Ne crede tali unguento,” —“ inter auxilia externa potius arrident mitiora unguenta.”

Many substances, as camphor, assafoetida, garlic, oil of amber, oil of turpentine, or cantharides dissolved in spirits, have been used as *liniments* or *embrocations*. The usual

practice is to rub them over the spine or on the chest, once or more times a day ; but it is generally agreed, that none of these external applications are of any value, unless they contain opium, the other ingredients being useful only inasmuch as they facilitate the absorption of the narcotic. The popular embrocations all contain opium ; and from this circumstance are much employed in the last stage of hooping-cough, and often with much success.

It sometimes happens that the disease, whether simple or inflammatory, resists all the resources of the medical art, however ably directed ; and if much depletion has been used, will even prevail with greater violence ; so that the child passes the day in a state of great excitement, and the night in restlessness, with a frequent recurrence of the paroxysms ; or else the inflammatory symptoms continue their course with scarcely any mitigation. In this almost hopeless state there are still some valuable auxiliaries, as pediluvia, the warm bath, and change of air.

" With respect to pediluvia," says Desruelles, (p. 137,) " I do not hesitate to say, that, after bleeding, they hold the highest rank in the treatment of the hooping-cough ; but as their derivative action is but momentary, they should be frequently used. Ozanam recommends them, with an addition of mustard; but I prefer the simple pediluvium, or those which are composed of equal parts of vinegar and water." Alas ! how various is the experience of medical men in this disease! for Frank says, " Pediluvia s^epe tussim augent."

Desruelles thinks the warm bath may be employed in cold and moist weather, but adds, (p. 313,) " Their use is dangerous if the child be threatened with congestion, or if the cough be violent. The practitioner should therefore be warned not to employ the warm bath but with the greatest reserve, nor allow the patient to remain in it too long." Watt, also, has employed them, but apparently without much success ; for he says, if the warm bath be employed, it should be only once or twice a week at most ; " for when used oftener, it disposes the patient to catch cold, and increases the

debility." Blache, however, is a strong advocate in their favour, and says: "I have seen Mr. Guersent, in cases of "great irritation, and with great frequency of pulse, and in "which no important organ was injured, obtain almost mar- "vellous results from the use of baths, of blood temperature, "repeated morning and evening. I have known children "sometimes remain in them two hours without a fit of "coughing; and they have often asked to remain in longer, "so much benefit did they receive from them. Cold water, "or a mixture of cold water and æther, should be applied, "during the time they are in the bath, by means of cloths, "to the head, in order to prevent the rush of blood in "that direction."

A change of air, from large towns to the country, is a resource of much greater efficacy than pediluvia or the warm bath; and is first mentioned by Dr. Forbes in his "Thesis de Tussi Convulsivâ," 1754. Since that period, it has been recommended by many physicians, and with that great praise it deserves. Watt says, (p. 217,) "I agree with Mr. Hayes, "that change of air, and pure air, are exceedingly necessary "to bring round the patient from a convalescent to a con- "firmed state of health; but this is not the only period in "which a change of air may be useful. I have known the "disease kept remarkably mild in many individuals, and in "several large families, by having the children almost con- "stantly in the open air from the very commencement, and "driving them about in the open air, from place to place, "in carts and open carriages. I have known many, when the "disease was very severe, on being taken into the open air, "get better every hour as they proceeded on their journey; "the patients scarcely giving a single cough, and the fever "going off entirely." Blau, also, joins in recommending a change of air; and says, he has seen children benefited by a change no greater than from one "quartier" of Paris to another; a sudden and notable amelioration, and sometimes even the immediate cessation of the cough, taking place. Roche recommends not only change of air, but likewise change of place; change of room, and also of clothing; and

upon the odd hypothesis of a constant re-infection; “the atmosphere in which the patient lies, as well as his clothes, being ever vitiated by the miasmata constantly given off from the pulmonary tissues.” He also employs the chloride of lime, as a means of dis-infecting the room the patient inhabits; and states, that many patients had done well by this means. Joly confirms this; and gives one case treated in this manner, in which the paroxysms were reduced from thirty or forty, to about four or five in the day and night.

It has been said, that change of air, even from a good air to a worse, is beneficial. In London there are few opportunities of witnessing such a change; but there are few practitioners who have not had many opportunities of seeing the astonishing effects of removing patients from London to the country, or from a bad air to a good one. An instance or two will exemplify this effect. A child, about five years old, laboured under hooping-cough, and no opiate could prolong the interval, or mitigate the paroxysm, or procure him rest; neither did bleeding in the slightest degree diminish the difficulty of his breathing; so that in the opinion of three medical men, there was little chance of his surviving under any circumstances; and one of the family had already fallen. At this extremity, a lodging was taken for him at so short a distance from London as Kensington, whither he was with difficulty conveyed. The first night of his removal, however, he slept soundly; the cough was tranquillized, the interval prolonged, and his recovery, from that time, was so rapid, that he required little further medical attention. A still more striking case occurred in a young gentleman sent home from Harrow school, ill of the hooping-cough, which he communicated to all the younger branches of the family; and the youngest, yet a baby at the breast, died. This patient laboured under hooping-cough with immense purulent secretion from the bronchial membrane; so much so, that pus was actually vomited up in large quantities, pure as from an abscess, and unmixed with any muciform matter. This case was treated for more than three weeks in London, but without the least diminution of the gravity of any symptom. At length, in

despair of his ultimate recovery should he remain longer in London, a lodging was procured for him at Hampstead ; and within forty-eight hours after his arrival there, the pus thrown up was formed into distinct sputa ; he slept well at night ; at the end of a week he was enabled to enjoy his walk, and in a short time he completely recovered. It is impossible to instance more striking proofs of the great advantages of a change from a bad to a good air.

Dietetic and general Treatment.—The patient should not be allowed animal food, and his diet in every respect be strictly antiphlogistical, almost to the termination of the disease. It is desirable, also, that the temperature of his apartment should be so regulated, that he should not be exposed to any considerable or sudden change from heat to cold. In mild weather also, if no local symptom forbids, he should be permitted to take exercise in the open air ; and likewise be recommended to wear flannel.

Preventive Treatment. — There are no known means of prevention, except an entire removal from every source of the contagion.

APPENDIX.

OF THE USES OF THE BROMIDE OF POTASSIUM IN DISEASES OF THE SPLEEN.

THE spleen is liable to a great variety of diseases ; as cancerous, tubercular, and melanotic deposits ; to hydatids ; to ossification of the serous membrane ; and to acute or chronic inflammation from various causes, terminating in many different manners. The most usual form of diseased spleen, however, is simple enlargement ; and when so affected, its particular states have been thus described by Dr. Abercrombie.*

“ When simple enlargement of the spleen is seen at an early period, it is accompanied by a state of highly increased vascularity. In the older cases, the structure is something of a bluish purple colour, breaking down under slight pressure. In others it is hardened, though of the natural appearance ; and sometimes the spleen has been found of an enormous size, without appearing in any degree to deviate from the healthy structure. This occurred in a case mentioned in the ‘ Medical Commentaries,’ in which it weighed 11 lbs. 13 ounces. In other cases, again, the disease presents a mixed character, resembling some of the chronic affections of the liver ; some parts presenting a tolerably healthy appearance, others being indurated, approaching to schirrus.”

“ The simple enlargement of the spleen occurs as the result of intermittent and remittent fevers ; but it is also said to occur from other causes.”—“ Patients affected with tumid spleen, are generally of a swollen, unhealthy aspect ; the bowels irregular, the motions generally dark-coloured. They are said to be liable to hæmorrhage from various parts of the body ; there is deranged digestion, with muscular

* Diseases of the Stomach and other Abdominal Viscera, p. 384.

" debility, and often a generally unhealthy state of the system,
 " with a tendency to sloughing sores from slight causes.
 " There is frequently a dry cough, and in protracted cases,
 " hæmatemesis, and at last general dropsy. Dr. Crane men-
 " tions, that he has known individuals in Lincolnshire affected
 " with it for twenty years, though they had generally a pale
 " or yellowish aspect;*" and Lieutaud mentions a spleen
 " which weighed 32lbs. in a woman who had had that dis-
 " ease, in a greater or less degree, for seventeen years."

Diseases of the spleen, from any cause, are rarely seen in the present day in London, but occasionally they do occur in the large hospitals of the metropolis ; and according to my experience we possess no sufficient remedy, even for simple chronic enlargement of this viscus. I saw many cases of this description after the return of our troops from Walcheren, but they all terminated fatally. Bitter medicines, and steel, recommended by Celsus, and for which the sulphate of iron has been substituted in modern times, have been often prescribed without success : while, generally speaking, the bowels, in cases of diseased spleen in this country, are so extremely irritable, as to render it impossible to exhibit the purgative medicines recommended by the Indian practitioners.† Mercury, which is highly spoken of by Dr. Good,‡ Wilson Philip,§ Thomas,|| Cullen, Pemberton, and by most systematic writers, is now generally admitted either to be of little service in reducing the enlargements of this organ, or else to be highly injurious ; producing mortification of the mouth, or rapid failure of strength. "I feel," says Mr. Twining,¶ "the more anxious fairly to shew the baneful effects of mercury in the disease now under consideration, because the instructions

* Edin. Med. and Sur. Jour. April 1823.

† The spleen mixture which Mr. Twining, after a variety of trials, found to answer best, is pulv. jalap. pulv. rhei, pulv. calumbo. pulv. zinzib. potassæ supertart. ææ 3j., ferri. sulphat. 3ss., tinc. sennæ, 3ss. aquæ menthae pip. 3ixss. ; of which 3j. or 3iss. bis. die., or in such quantity as to produce three or four stools a day.

‡ Study of Medicine, vol. i. p. 414.

§ On Febrile Diseases.

|| Practice of Physic, p. 192.

¶ Med. and Phy. Trans. of Calcutta, vol. iii. p. 394.

" usually laid down in the best systems of medicine, in the
" present day, do not inculcate the avoidance of mercury in
" any case of enlarged spleen; nor do they advert to the
" pernicious effects of that medicine in that state of disease
" I have denominated vascular engorgement." This gentle-
man, in further proof of this position, gives thirteen cases, in
which the patient either died of mortification of the cheek,
the nose, the upper lip, or after having lost his teeth, or a
large portion of the jaw, in consequence of the use of mercury,
or supposing him to have survived its employment, in which
the spleen remained permanently enlarged. The opinions of
Dr. Voigt, physician to the Danish establishment at Seram-
pore,* are nearly similar. He states, " that chronic diseases
" of the spleen are so frequent and fatal throughout India,
" especially in the low and marshy districts of Bengal, that we
" have good reason to complain of the neglect with which
" they have hitherto been treated;" and he adds, " that
" although most authors recommend mercury, it is an indis-
" putable fact, that even a very small quantity, a few
" grains, for instance, generally occasions a profuse salivation,
" and occasionally so violent a stomachace mercurialis, that
" mortification sets in, the teeth drop out, the bones become
" carious, and death ensues." Dr. Abercrombie has suggested
that the external " application of iodine might be useful;"
but Mr. Twining says,† " I have given the tinc. of iodine a
fair trial in six chronic cases of tumid spleen, and was satisfied
that it was of no service in that disease."‡

* British and Foreign Med. Review.

† Med. and Phy. Trans. of Calcutta, vol. iii.

‡ I have met with one case of diseased spleen which was most rapidly reduced by the exhibition of the iodide of potassium, and which induced me to give this remedy an early trial in the cases of Cobb and of Nursay, though without success. It was that of a man about thirty years of age, and who, as far as I recollect, had been exposed to malaria. He was of a tall and powerful frame, but had suffered long, and taken many different medicines; so that he was, on his admission, as much reduced as a person in the last stage of phthisis, while his spleen was enormously enlarged, filling the whole of the abdomen. The iodide of potassium, grs. viii. ex mist. camphoræ, t. d. was prescribed for him; and to our great gratification and astonishment, the reduction of the spleen and his improvement in health and strength were so rapid, that in a few weeks he left the hospital so greatly benefited as to be scarcely recognized.

It has appeared, therefore, that a more efficient remedy for these forms of disease was a desideratum in medicine ; and after the success which attended the exhibition of the iodide of potassium in some forms of secondary syphilis, it seemed reasonable to expect that bromium might afford salts, possessing similar, or at least equally valuable medicinal properties ; especially as that elementary fluid is remarkable for its extremely pungent and acrid qualities. With this object, therefore, I was induced to institute a treatment by the bromide of potassium in many different diseases ; but as a general result, I have not been able to attribute to that substance any other valuable medical property* than that of reducing enlarged spleens ; a property which, if established by further experience, would render it invaluable in our colonies, diseases of that viscus and their concomitant symptoms being the endemic cachexia of tropical countries. Diseases of the spleen are not common in London, even in the practice of a large hospital ; and the following cases are all that I have had an opportunity of treating with this medicine ; but as it was singularly successful in all, there is a high probability that its powers over this disease may be of a specific character ; and being anxious that the experiment should be repeated by those who have more extended opportunities than myself, I have submitted them thus early to the public.

* In the following case, however, of dropsy, it effected more than the most approved remedies :—

Maurice Sheedy, a man of about forty years of age, was admitted, February 26th, 1835, into St. Thomas's Hospital. He laboured under ascites, for which no cause could be assigned, and had been ill six weeks ; he made an extremely small quantity of water, which gave no precipitate by heat. The potassæ supertartratis 3j. t. d. was prescribed and taken till the 30th of March, but without benefiting the patient. On that day, therefore, it was omitted, and elaterii, gr. j. a. n. substituted. This medicine was taken till the 13th of April, when no impression having been made on the disease, it was found necessary to return to the supertartrate of potash, which was persevered in till the 7th of May, but still without success. Two of our most potent remedies having failed, and the hope of saving the patient daily decreasing, the bromide of potassium, gr. x. t. d. were prescribed, and on the 23d of July he was discharged, much improved in health, and entirely emptied of the water, no fluctuation having been perceptible for some weeks. It was with regret, however, that shortly after I found the patient had relapsed ; but he was not again placed under my care.

Thomas Nursay, aged fourteen years, was admitted into St. Thomas's Hospital September 13, 1833. He had been ill eighteen months, and had taken a variety of medicines ; but his friends could not trace his present disorders to any known source, nor did they admit that he had at any time been exposed to marsh miasmata. On examining his abdomen, both the liver and the spleen were found enormously enlarged, so that they met at the median line, and could be traced downwards till they were lost in the pelvis. Their edge, also, was hard, and their substance solid and unyielding, while much fluid was detected in the abdominal cavity ; the boy's countenance was sallow and emaciated, his legs dropsical, his belly unsightly protuberant, and the prognosis from all these circumstances was most unfavourable. As I had seen the iodide of potassium successful in one case only, while it had failed in others, I prescribed, with a view of removing the water, potassæ supertartratis, ss. a. m. This medicine he took for a month, or till the 17th of October, without any sensible advantage ; consequently I omitted it on that day, and substituted potassü iodide, gr. viii. t. d. ; under this remedy he made more water than on his first admission, and more than when he took the supertartrate of potash ; but still the progress of the case was so little satisfactory, that on the 2d of November I was induced to change the treatment to the hydrargyri iodureti, gr. j. bis die., which medicine salivated him in a few days, and rendered his mouth sore for some weeks. The quantity of water in the abdomen was by this means something reduced, but neither the liver nor the spleen were as yet sensibly diminished.

Three great experiments having now been made without success, little was done till the 13th of May, 1834, when I prescribed for him potassii bromidi, gr. j. t. d., and gradually increased it to grs. iv. ex mist. camphoræ, t. d. This medicine he took till the 10th of July, when he became slightly jaundiced. As I was apprehensive the bromide of potassium might have caused this derangement of the liver, which I was satisfied would quickly subside under a treatment by the sulphate of magnesia, I prescribed that remedy in 5ss. doses, and for a

time omitted the bromide of potassium. By the 11th of August the jaundice had disappeared, but no diminution of the diseased viscera appeared to have taken place since he had ceased to take the bromide of potassium. The sulphate of magnesia was therefore omitted on the 11th of August, when the bromide of potassium, grs. iv., and which was increased on the 15th to grs. v., was again prescribed, and continued with only an occasional intermission till the 7th of October, 1835, or for a period of about fourteen months. A few weeks after he began this long course, he was able to leave his bed, and to be about the ward, and his recovery was now so rapid, that for many months subsequently he amused himself in spreading plaisters, and making himself generally useful in the hospital. At the time of his discharge, the liver and spleen, as far as could be judged, were not more than one-third their former size, while their previously hard edge and consistency could no longer be felt. As the general health of the boy was now good, and he had grown many inches, his friends at the hospital provided him with a place as foot-boy, so that I saw him occasionally, and in good health, for many weeks after his dismission. He was, however, at length sent away for some misconduct, and I have not since heard of him. This case was most remarkable, both for the success of the remedy, and also as demonstrating its entire harmlessness, even when administered for a long time. The results indeed of this case were so striking, that I have reason to believe they were the cause of this substance being introduced into the pharmacopœia.

Mary Cobb, a Cambridgeshire person, and about thirty years of age, was admitted November 28, 1833, into St. Thomas's Hospital. She stated, she had been ill not more than two months, but on examining her, she was found to be labouring under ascites, together with an exceedingly large spleen, filling the whole of the left side of the abdomen, while its hard edge could be distinctly felt, till it was lost in the pelvis. She was greatly emaciated, and her pulse was counted at 130. The iodide of potassium, grs. viii. ex mist. camphoræ, t. d., were prescribed, but this quantity was found to operate too

severely on her bowels, and was shortly reduced to grs. iii. 6tis. Under this treatment, the water effused into the abdomen was something reduced, but no sensible alteration had taken place in the tumour. Still, however, her general health was much improved, and on the 27th February, 1834, the place of nurse to the ward being offered her, she accepted it, and was discharged.

On the first of May, however, she was again admitted, with every symptom aggravated, the water effused into the abdomen being increased, her legs more ædematos, while the spleen, as far as we could judge, was even larger than before. The iodide of potassium, grs. v. c. tinc. *hyoscyami*, m. xv. ex mist. camphoræ, t. d. was again prescribed, but her bowels and stomach were so irresistible, that the draught was immediately rejected, and consequently the tinc. *scillæ*, c. tinc. *digitalis*, aa m. xii. c. *potassæ acetatis*, 3ss. ex mist. camphoræ 6tis. were substituted, but without any success, and therefore these medicines were changed on the twelfth, for the hydrargyri iodureti, gr. ss. o. n. From this remedy some benefit was derived, and the ascites prevented from increasing; but still the progress of the case was so slow, and the danger so imminent, that having satisfied myself of the great advantages which the boy Nursay had experienced from the use of the bromide of potassium, I determined to employ that remedy in the present instance. On the 2d of June, 1834, therefore, I prescribed for this person, bromidi potassii, grs. iii., and gradually increased the dose to grs. v. t. d., but iv. grains were found to be the largest dose she could take without greatly disordering her bowels. The effects of this medicine were extremely remarkable, for in a few days the ædema of the extremities subsided, and very shortly the fluid effused into the abdominal cavity was absorbed, while in the course of a few weeks the spleen was considerably reduced, and its hard edge rendered soft and yielding. From this period she began to recover her flesh and strength, and grew so fat, that it was impossible to feel the tumour through the walls of the abdomen, although, from the dulness on percussion, it was evident that the spleen was of greater magnitude than natural. Her

arms also became hard and fleshy, and exhibited every sign of health. The bromide of potassium was continued from June 2d, 1834, to March 19th, 1835, or more than nine months, when, considering herself to have recovered, she was at her own request presented.

Six weeks, however, had scarcely elapsed, when this patient again returned to the hospital, apparently in good health, but with an enlarged bursa on the knee, which had been produced by scouring. As I was anxious to have this person under my observation, I again admitted her. It was necessary repeatedly to blister the knee, and the irritation and confinement to which she was consequently subjected, produced so much derangement of her general health, that to our regret she was seized, on the 27th of May 1835, with most profuse hæmorrhage, both from her stomach and bowels, five or six pounds of blood being passed in a few hours. But this excessive evacuation very little impaired her general health, and her appetite continuing good, she quickly recovered on bleeding her to $\frac{3}{4}$ xii. and prescribing for her acid sulphurici dilut. m. xxv. ex inf. rosæ, 3tiis. horis, with lemonade. I permitted her after her recovery still to remain in the hospital, and on the 5th of August, as she complained of splenalgia, which we attributed to adhesions having formed, and united some portions of the spleen to the surrounding parts, the bromidi potassii, grs. v., were again prescribed for her, and which she took once or twice a day as she thought proper. On the 15th of November, however, she was again seized with a still more profuse hæmorrhage than before, and notwithstanding the use of mineral acids, lemon juice, opium, the supertartrate of potash, oranges and wine, she sank on the 28th of November, 1835. On examining the body, the *lien ingens*, which had formerly filled so large a portion of the cavity of the abdomen, was found still large, perhaps thrice its natural size; but instead of being hard and indurated, as at her first admission, it was perfectly healthy in structure. The peritoneum was, however, greatly diseased, being white, opaque, and greatly thickened throughout its whole extent, while many strong and old adhesions connected it to the spleen. The liver also

was found to be singularly knobbled, and in colour greatly resembled pale dried Turkey rhubarb. The death of this patient, therefore, appeared to have more immediately resulted from the irritation caused by the diseased peritoneum, and from the singular state of the liver rather than from the spleen.

On the 16th of October, 1834, James Hutton, aged twenty-five years, was admitted into St. Thomas's Hospital, with an enlarged spleen. He stated, that some months ago, he had received a violent blow on the left side, after which his spleen began to enlarge so rapidly, that he sought admission into Guy's Hospital, where he remained for many weeks, and although actively treated, the tumour continued to increase so, that he at length determined to apply at St. Thomas's. On examining him, his side bore evident marks of his having lost much blood by cupping, while the spleen could be felt of great size, extending to the median line, and from under the ribs below the umbilicus. Its edge also was hard and indurated, and the whole side was painful on pressure. His general health was also much impaired, his tongue being white, his bowels irritable, and during the time he remained in the hospital, he had two or three sharp attacks of fever, each of which lasted three or four days. The bromidi potassii, grs. v. c. tinc. hyoscyami, m. xv. ex mist. camph. t. d. was prescribed for this patient, and continued with only slight modification till he left the hospital, on the 2d of April, 1835. At this time the pain in the side had entirely subsided, his health was good, and the spleen, according to his own calculation, was only one third of the size he considered it to be at the time of his admission.

Mary Ann Lovegrove, about forty years of age, was admitted into St. Thomas's Hospital 7th of May, 1835. She stated that she had been ill nine or ten months, and having been unsuccessfully treated at Portsmouth, that she had come to London for advice. On examining her, the spleen was found to be considerably enlarged and hard, while on the right side, the liver, with a hard round edge, could be distinctly felt below the ribs. Bromidi potassii, grs. x. ex mist. camph. t. d. were prescribed for this person, her state of bowels and general

health permitting an increased dose. This remedy was continued till the 11th of August, when she was discharged in good health, neither the spleen nor the hard edge of the liver being any longer to be felt.

The successful result of four cases, if we consider the death of Cobb to have been caused by the state of the peritoneum and of the liver, rather than of the spleen, gives a reasonable hope, that the bromide of potassium must possess unusual, if not specific powers in the cure of diseases of the spleen; while its effects in Nursay's and in Lovegrove's cases on the liver were not less remarkable. As many months may elapse before other persons labouring under diseased spleen may intrust themselves to my care, it has been thought best, although the utility of the medicine may not be demonstrated on a sufficiently enlarged scale, to submit these cases to the profession, in the hope that a practice which may prove of such infinite value in the low districts of England, and in our colonies, may receive a further trial. From the harmless nature of the remedy, there appears no limit to the time it may be exhibited, and the dose may perhaps admit in some cases of being considerably increased, but in three of those which have been related, the irritable state of the bowels did not allow more than grs. iv. to v. being exhibited, and even then it was occasionally necessary to give opium. It is the most purely saline, and consequently the most pleasant to the taste of all the remedies of its class.





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